ZOE

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A BIOLOGICAL JOURNAL.

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CONNECTING FORMS AMONG POLYPOROID FUNGI.

BY LUCIEN MARCUS UNDERWOOD.

Read before the Indiana Academy of Science December, 1891.

As a prelude to this preliminary paper on the generic limits of the Polyporei, we wish to call attention to some of the anomalies in the pronunciation of the plural of *fungus*. The novice, innocent of classical erudition, usually essays it as *fŭngī;* the classically minded man brings it out as *foon-ḡee*, while a growing tendency, fathered at Harvard, fostered at Cornell, and by them distributed far and wide is *fŭngē*. This last is (1) a hybrid and (2), a monstrosity, and should be relegated to the department of teratology. Clearly two forms are allowable. If with our classical friends we believe that some novelty must be instilled into a dying tongue, then the melodious (?) *foongee* may be used. But since English is destined to take the place formerly held by Latin as the universal language of science, we deem it more logical as well as involving more common sense to say *fŭngī*.

The oldest genus of this family is Boletus established by Dillenius in 1719[1]. In this genus Linnæus included all the "Pore-fungi" known to him, passing over Polyporus established by Micheli in 1729[2]. Haller established Merulius in 1768[3], and Bulliard added Fistulina in 1781[4]. When Persoon gave his systematic survey of the fungi in 1801[5], three genera were recognized. Of these he established Dædalea and adopted Merulius (under which he placed Cantharellus, Adans. as a sub-genus), and Boletus (under which he

[1] Cat. Giss. 188.

[2] Nova Plantarum Genera, 129.

[3] Helv. em. 150.

[4] Champ. I, 314.

[5] Synopsis Methodica Fungorum.

included as sub-genera Fistulina, Polyporus and Poria). Fries in 1821[1] recognized five genera: Merulius, Dædalea, Polyporus, Boletus and Fistulina; in 1836[2] he added Trametes, Cyclomyces, Hexagonia, Favolus and Porothelium, and retains essentially the same arrangement in his Opus Maximus in 1874[3]. Berkley separated Strobilomyces from Boletus in 1860[4], and Kalchbrenner set apart Boletinus in 1873[5]; in this he has been followed by Peck,[6] who has made a special study of the American forms. Later writers have been more profuse in establishing genera. Peck[7] established Myriadaporus, which is based on an apparently monstrous growth; Karsten in 1881[8] from a study of the flora of Finland alone established eighteen new genera; Schrœter in 1888[9], while adopting only a few of Karsten's new genera, added three of his own from the flora of Silesia; Ellis and Everhart[10] have separated Mucronoporus based on the exceedingly slender character of pubescence of the interior of the pores! following a doubtful analogy to Hymenochæte, and last of all, M. C. Cooke has separated Sclerodepsis[11] from Trametes, a genus which already lacked any marked characters to separate it from Polyporus.

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[1] Syst. Mycol. I, 6.

[2] Genera Hymenomycetum.

[3] Hymenomycetes Europææ.

[4] Outlines of British Fungology, 236.

[5] Icones Selectæ Hymenomycetum Hungariæ, 52.

[6] Bulletin New York State Museum, No. 8 (1889).

[7] Bull. Torrey Bot. Club, xi, 27 (1884).

[8] Enumeratio Boletinorum et Polyporearum Fennicarum, systemate novo dispositarum, *Rev. Mycol.* 1881. The genera are Tylopilus, Cricunopus, Tubiporus, Rostkovites and Krombholtzia, among the Boletineæ; and Polypilus, Tyromyces, Polyporellus, Ganoderma (founded on *Polyporus lucidus*), Piptoporus (founded on *P. betulinus*), Fomitopsis, Bjerkandera (including *PP. adustus, hirsutus, versicolor, abietinus*, etc.), Antrodia, Hapalopilus, Pycnoporus, Caloporus, Ischnoderma, and Inonotus, among the Polyporeæ.

[9] Kryptogamen Flora von Schlesien, Pilze, i. The genera are Ochroparus, Phæoporus and Dædaleopsis, the last founded on *Dædalea confragosa*. Schrœter also separates *Merulius lacrymans* under Serpula Pers. (1801, as sub-genus), revives Suillus Mich. (1729), and further includes all of Lenzites among the Pylyporei.

[10] Jour. Mycology, v, 28 (1889).

[11] Grevillea, xix, 49 (1890).

To one who has made any considerable field study among the Polyporei their most striking peculiarity is extreme variability owing to habitat, state of growth, seasonable conditions and many other circumstances of environment. When *Polyporus hirsutus*, for instance, grows on the upper side of a log its pileus tends to produce a complete circle, thus reducing its attachment to a short central stem; when it grows on the side of a log its pileus has the normal semicircular form, but when it grows beneath the log it is reduced to a completely resupinate condition. And yet these forms represent three of the five subgeneric sections of Polyporus as usually recognized! It is easy to see how closet botanists poring over some herbarium fragments of pore-fungi, pour forth new species and genera by the score.

The connecting character of the family has long been noted. In 1836 Fries writes: "*Prorsus intermedii inter Agaricinos et Hydneos*[1]." Peck[2] has given an extended discussion of the intermediate character of the variable *Dædalea confragosa* showing its intimate relations to the three genera, Polyporus, Trametes and Lenzites. Two other common species of Dædalea possess also intermediate characters. *D. ambigua* is clearly in the form of its pores a species of Dædalia, but in its texture and other characters it is a species of Trametes with which indeed Fries had united it. *D. unicolor*, especially in its older stages, can scarcely be distinguished from an Irpex. Polyporus is also connected with Irpex through two variable and closely allied species, *P. abietinus* and *P. pergamenus*. Indeed these species are so closely related in some of their forms that their chief difference consists in one uniformly growing on the wood of Coniferæ and the other on the wood of deciduous trees! The lacerate pores of these species are often difficult to distinguish from the flattened teeth of Irpex.[3] Polyporus is further related to Lenzites through a polyporoid form of *Lenzites sepiaria* which, taken apart from its evident connections, would form an excellent species of Polyporus.

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[1] Epicrisis, 408.

[2] 30th Regents Report, 71.

[3] Peck (42d Regents Report, 38), has described var. *irpiciformis* of *P. abietinus* and calls attention to a second form of this species, which has been described as (*Irpex fuscoviolaceus*).

Through Strobilomyces, whose habit, combined with structural characters, is perhaps sufficient to keep it distinct, Polyporus passes to Boletus, and from Boletus there is a gradual connection through Boletinus, which stands on uncertain footing, to Paxillus, another genus of Agarics. Through Merulius with fold-like pores still another passage is made to the Agarics in the direction of Cantharellus. Sufficient has been said to verify the assertion of Fries, that the family is intermediate between the Agarics and the Hydnei.

A few conclusions may be drawn from the preliminary survey:

1. Among the Polyporei at least, Gœthe's statement that species are simply creations of the text-books, finds abundant illustration and warrant.

2. Generic and family limits are also exceedingly vague. Many of the genera are simply form-genera, and there is an amazing variety of connecting forms.

3. Several of the genera of Polyporei, as commonly accepted, have no rational basis on which to stand. From the genus Polyporus thirty genera could easily be formed with as valid reason as several that now exist. When characters are so poorly defined it seems a more rational proceeding to leave forms in few large genera than to establish new genera on characters that would ordinarily be regarded as merely specific. In regard to some of these genera we will specify changes:

(a) Trametes, with "trama descending between the pores," hangs on an exceedingly slender thread and had better be reunited with Polyporous. Though an error, it is perhaps significant that Saccardo describes *Polyporus cinnabarinus* under both Polyporus and Trametes[1].

(b) *Glœoporus*, with "gelatinous hymenium," has no more reason to be separated from Polyporous than *P. lucidus* has to be erected into a genus because it has a varnished skin[2]. It had best be returned to its original fold unless the South American forms reveal something more unlike Polyporus than has yet been discovered in the United States.

(c) Favolus, with "large angular pores," cannot stand as a genus if *Polyporus squamosus*, *P. lentus*, *P. arcularius*, and their allies,

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[1] Sylloge Fungorum, vi, 245, 353.

[2] Cf. Karsten *loc. cit.*

with pores just as large and just as angular, are to remain in Polyporus. We suspect that the same is true of Hexagonia, but we have seen too few species of that genus to form a definite conclusion.

(d) Mucronoporus, with spines within the pores, stands on about as valid ground as would a genus established on *Polyporus hydnoides* and characterized by the bristly hairs which thickly cover its pileus. Were the systematists among the flowering plants to divide every genus that possessed both glabrous and pubescent species, there would be even more hair-pulling in their ranks than has yet appeared.

(e) The subdivision of Polyporus on the basis of the color of the cortex and spores, as proposed by some continental botanists[1], is no more rational than to divide Viola into three genera to contain the blue, yellow and white flowered species respectively.

(f) No more rational is the sub-division of the same genus into Fomes, Polystictus and Poria. This seems to have been attempted by Fries[2] as a sort of experiment, but was not continued by him in his Opus Maximus,[3] nor other later writings. M. C. Cooke resurrected this classification in his Præcursores,[4] and he was almost immediately followed by Saccardo[5]. A few American mycologists, who do not seem to appreciate that Saccardo's Sylloge is a convenient compilation rather than a critical conspectus, have also adopted it bodily.

4. Dædalea will probably have to be united with Lenzites, but whether this united group will be agaric with polyporoid affinities, or polypore with agaricoid affinities, it would be hard to decide with the light thrown upon the genus by American species.

5. The genera about which there is no present suspicion are, so far as our flora is concerned, Polyporus, Boletus, Fistulina, Solenia, Merulius and perhaps Strobilomyces. Porothelium and Cyclomyces are not sufficiently known to us to permit a judgment.

[1] Cf. Schrœter *loc. cit.*

[2] Novæ Symbolæ Mycologicæ, 1851.

[3] Hymenomycetes Europæ, 1874.

[4] Præcursores ad Monogragraphia Polyporovum, Grevillea, xiii, 80–87, 114–119; xiv, 17–21, 77–87, 109–115; xv, 19–27, 50–60 (1885–6).

[5] Sylloge Fungorum, vi.

GEESE WHICH OCCUR IN CALIFORNIA.

BY L. BELDING.

The earlier writers credited this State with five forms of geese. These are now known to ornithologists as *Chen hyperborea*, *Anser albifrons gambeli*, *Branta canadensis occidentalis*, *B. canadensis hutchinsii*, and *B. nigricans*. In the fall of 1878 I sent a specimen of *Chen rassii*, which I got at Stockton, to the National Museum. It may have been collected here previously, but this was the first that I know of.

Number 76,654 of the U. S. National Museum, published in Partial List of Birds of Central California, under the name of *Chen albatus*, was probably a juvenile *C. hyperborea*, but I am not quite convinced that such is the fact. I think Mr. Ridgway ascertained that *albatus* is a synonym of *hyperborea*.

In 1885 Mr. Ridgway gave the smallest goose of the *canadensis* pattern of coloration the name of *Branta minima*, but afterward, during the same year, reduced it to subspecific rank, with the name of *B. canadensis minima*. A year or two later Mr. C. H. Townsend published the fact that Mr. Fiebig had collected *Philacte canagica* at Eureka, and during the past winter Mr. Ridgway identified parts of a goose I sent the National Museum from Stockton as belonging to a true *Chen cærulescens*.

Besides these, I believe the typical *Branta canadensis* occurs in California, but doubt if any specimen is in existence to prove the correctness of this opinion.

It may not be inappropriate in this connection to remind the ornithologists of California that we need a collection that contains a series of every American bird, and that without such a collection efforts to progress are unnecessarily difficult and will continue to be unsatisfactory.

LESSER SNOW GOOSE. *Chen hyperborea*. This is the very abundant white goose, which breeds in Alaska; reaches California about the first of October (Stockton Sept. 29, 1881; Gridley Sept. 30, 1884; Stockton Sep. 28, 1886), and leaves for its northern breeding grounds about the middle of April, a few remaining as late as the first of May.

At Stockton, in 1880, I saw the last flock April 30. They had been rare since the twentieth. They were last seen at Gridley April 28,

1884, and were last seen at Chico by Mr. Proud on April 27 of the same year. They sometimes enter California from the east slope in Nevada and leave in the same direction, probably stopping awhile about the numerous lakes of Nevada and northeastern California.

Mr. Evermann says it is an abundant winter resident of Ventura County. It was abundant in the northern part of San Diego County in the winters of 1884 and 1885, and Mr. Morgan told me, he saw a great many of these and other geese at Ensenada, and on the head of the Gulf of California in the winter of 1883–84, which is probably about as far south as it goes on this coast.

BLUE GOOSE. *Chen cærulescens.* Two of these geese were shot, one day, about February 1, of this year, by two hunters who were hunting together near Stockton. Mr. M. J. Shaw of the game market kept one of them on exhibition as long as he could, and then saved the head and neck, wings and legs. These fragments were all that I saw of the bird, and these I sent to Mr. Ridgway for identification. He said it was a true *Chen cærulescens*—a juvenile.

There was no white or light shade on the chin, nor on any part that I saw, and several persons who saw this goose before it was dismembered told me it was entirely blue except the quills. These were brownish-black. The blue was nearly that of the sand-hill crane. The wing measured about 15, tarsus 3, middle toe and claw very nearly 3, the naked culmen 2 inches.

I think the blue goose has not heretofore been reported in California, though my belief has been for nearly ten years that I have occasionally seen the plumage which is attributed to the adult, a few of which I shot, besides some I had seen in market, but the plumage of the uniform blue bird described above is new to me, as it was to many sportsmen and others who saw Mr. Shaw's specimen.

ROSS'S SNOW GOOSE. *Chen rossii.* This diminutive white goose can readily be separated from any other form, being much smaller than any and having a warty appearance at the base of the bill. They weigh each about two and one-half pounds, have light colored flesh and are very palatable.

They breed in Arctic America, arrive in California with, or about the same time other white geese arrive, and probably go as far south

as they do, though I believe it has not been recorded south of Ventura County, where Mr. Evermann noted it as being frequent in winter.

My earliest notice of arrival is October 6, at Stockton, when I saw more than a dozen in market. It is a regular winter visitant to California and may nearly always be found in the Stockton market, as long as any of the wild geese are kept for sale. In the coldest weather few geese can be found in the interior of the State, north of Stockton.

Its notes are different from those of the other white geese. I kept a "winged" pair several months, which always resented undue familiarity. The male would always lead the female away from me and utter a strange grunting dissent if I got within a few feet of them. They had been captives a year already when I got them and must have had some sad experience, for I have known individuals of this species to be very tame. One day I found a nest in a pile of rubbish in the poultry yard, which had six eggs in it. The eggs were concealed with a covering of straw in regular goose fashion, and there were no other geese in the yard. I had several times seen the pair about this part of the yard and thought they might have a nest there, but the eggs I found were so much like hen's eggs in shape, and appearance of the shell, that I thought they might be hen's eggs. I never solved the problem, a young zealous egg-gathering lad having discovered and appropriated them. The pair finally escaped from neglect to keep their wings clipped.

American White-fronted Goose. *Anser albifrons gambeli.* This is known by hunters as the speckled-belly and yellow-legs. It breeds in the Arctic regions, and, according to Mr. Fannin, as far south as Vancouver Island. It is the first goose to arrive in California and the last to leave, staying a little longer than the white geese; is very abundant and fairly good for the table. It arrived at Stockton Sept. 7, 1878; Sept. 8, 1881. My latest spring record for it here is May 3. A great many passed Stockton the previous day on their way north.

Mr. Bryant found it as far south as Guadalupe Island in winter, and I heard of four near Cape St. Lucas, but the latter was exceptional.

Its early arrival in California is nearly every fall announced by the newspapers of the interior as an indication of an early winter.

In 1884, the Sacramento Record-Union of Sept. 2 noticed the arrival of geese, which were unquestionably of this species.

It is sometimes named the laughing goose, a name probably derived from its notes rather than from its gaping mouth.

CANADA GOOSE. *Branta canadensis.* Mr. Fannin says: "It is a very abundant resident of British Columbia, breeds throughout the interior of the mainland, appears in great flocks along the lower Frazer River during the winter months and affords fine sport for the hunters."

Dr. J. C. Merrill in the Auk of April, 1888, says (at Fort Klamath): "Of *occidentalis* I saw none, although they doubtless occur here. *Canadensis* seemed to be typical."

Like *Otocoris alpestris merrilli* and other birds, the Canada goose probably crosses the mountains and spends the winter in the Sacramento Valley, and perhaps in other parts of this State. In Yuba and Butte counties I have occasionally during many years noticed small, paler flocks of "Honkers," which reminded me of those I had seen and shot on the Illinois and Platte rivers.

HUTCHINS'S GOOSE. *Branta canadensis hutchinsii.* This for convenience on this occasion, we will call the medium-sized honker. It breeds in Alaska.

It is very abundant in the State in winter, arriving in the Sacramento Valley about the tenth of October. My earliest fall notice of it in Butte County is Oct. 9, 1884, at which time it was abundant. In the fall of 1891 I did not see or hear it until about Oct. 20, and my observations accorded with those of the market hunters on Butte Creek. It remains in the Sacramento Valley until about April 20, sometimes a few days later.

It goes about one hundred miles south of San Diego, according to Mr. Anthony, and is numerous in parts of San Diego County in winter.

Its notes are unlike the notes of *occidentalis*, and are also different from the notes of *minima*. I think it varies more in size than the latter, and that this variation is responsible for the difficulty experienced by some writers in separating them.

This goose was abundant during March, 1892, on Butte Creek, and about Gridley, but I did not hear or see *minima*. I have often seen them in separate flocks, but I oftener see these, like other geese, in large mixed flocks of various kinds.

WHITE-CHEEKED GOOSE. *Branta canadensis occidentalis.* This is the "Honker" of California hunters.

It is abundant in the State in winter, though not nearly as numerous as several other kinds of geese. It seldom arrives before the middle of November, sometimes considerably later, and not until comparatively cold weather sets in. It begins to leave usually about the middle of March, and I have seen a flock going east over the snow-covered Sierra Nevada as early as Feb. 22, 1887, during a mild sunny morning when I was hunting just below the snow line in Calaveras County, as I have often seen them going here and in Yuba County under similar conditions.

In Partial List of Birds of Central California, I am credited with the statement that this goose comes to this State and leaves it about same time that the American white-fronted goose does—one of the very few errors in that paper, which was otherwise very satisfactory to me. In that paper I mention that I have often seen this goose crossing the mountains (and leaving) about the middle of March, which partly corrects the error which must have occurred by an incorrect reading of my writing. I have not seen this goose as far south as San Diego County, but Mr. Morgan told me he had seen a flock of about a dozen at La Hoya, twelve miles north of San Diego, and had shot several of them.

I first saw it in market at Stockton Nov. 11, 1880, Nov. 23, 1881; at Gridley, Dec. 2, 1885.

It breeds sparingly in a large marsh at Tallac Point, Lake Tahoe, or did so recently; at Pyramid Lake and other lakes in the Great Basin, on the east slope of the Sierra, and is the only goose which is known to breed in any part of California. Its breeding habitat is much more southern than that of any other of the geese.

Mr. Fannin, in his Check List of Birds of British Columbia, refers to a single specimen taken in the interior of B. C., from which I conclude that he considers it rare in the province.

CACKLING GOOSE. *Branta canadensis minima.* This, the smallest goose of the honker color, is perhaps more abundant than any goose found in the State. On Butte Creek, a favorite resort for geese especially when they first arrive from the north, I am confident that I have seen a half a million of these geese in a single day. They arrive there from the first to the tenth of October; were already numerous Oct. 1, 1884. In the fall of 1891 it was in considerable force there, about two weeks before *hutchinsii* arrived.

My earliest Stockton date of its coming south is October 12; my latest spring record is April 25.

Mr. Morgan told me it arrived at Ensenada Oct. 12, 1884, and that he afterward saw it on the Blythe estate on the Gulf of California. I have seen it in San Diego County, and believe it goes as far south as Hutchins's goose.

The notes of *minima* are much higher in pitch than are those of *hutchinsii*. I noticed this the first time I ever saw them, in the year 1856, and upon asking my experienced hunting companion the name of a flock of *minima*, as it darted and tumbled in great disorder into the water, uttering the oft repeated notes which Mr. Nelson calls "luk-luk," he said it was the little squeaking goose, a name which I tried to give it in Partial List of Birds of Central California, but by an error the name was printed squawking goose. This goose is apparently generally known and distinguished from its larger cousins by the sportsmen of the State. Cackling goose is an appropriate name for it. I think it a good species. It breeds in Alaska.

BLACK BRANT. *Branta nigricans*. This is a coast species, and I doubt very much if it ever goes inland. It breeds on the arctic shores of Alaska, and scatters along the coast to about three hundred miles south of San Diego in winter.

I have not seen any of the species between San Francisco and the vicinity of San Diego, but a short distance north of San Francisco, at Bodega Bay, Mr. Palmer found it in abundance in March, 1885.

It leaves Alaska and comes south between the middle and last of September, according to Mr. Nelson, and remained at San Quintin Bay to May 9 or 10 in 1881, though it dissapeared from San Diego Bay April 15, 1884, and April 7, 1885, its departure having probably been hastened by the persecutions of the hunters.

It was until recently abundant in San Diego Bay in winter. Its flesh has an oily or fishy taste.

EMPEROR GOOSE. *Philacte canagica*. Collected at Humboldt Bay in the winter of 1884 by Mr. Fiebig. This is the only known occurrence of this northern species in California.

NOTES ON THE TENEBRIONIDÆ OBSERVED IN SAN DIEGO COUNTY.

BY F. E. BLAISDELL.

Edrotes ventricosus Lec. A short, robust, and very convex species, found in the Colorado Valley, which includes the eastern or desert portion of the county. It is wingless and sparsely clothed with long hairs.

Triorophus lævis Lec. Occurs in the northwestern portion of the county. The species is apterous, and has the facies of an Otiorhynchide.

Stibia ovipennis Horn. Inhabits the seashore and is found beneath the beach-berry (*Mesembryanthemum æquilaterale*), growing upon the sand dunes. This species differs from *maritima* in its larger and more robust form, smaller eyes, and larger, stronger elytral punctures.

Stibia maritima Casey. Inhabits the Coronado peninsula, not confined to the seashore. Moderately common, rarely blackish in color.

Eurymetopon rufipes Esch. Occurs in the central and eastern portions of the county.

Eurymetopon convexicolle Lec. Oblong-oval in form, and black in color. Very abundant beneath bark of trees and any object resting on the ground—as boards, rocks, etc. Feebly pruinose when first captured, although, the older the individual the less the liability to being so.

Eurymetopon inflatum Lec. A broad, elliptical species, ocurring in immense numbers in the sand dunes beneath the beach-berry and other maritime plants. Varies greatly in color, from black to pale ferruginous.

Emmenastus longulus Lec. An elongate-oval species, highly polished, varying in color from blackish to rufo-piceous, and generally strongly pruinose when observed in nature. Occurs abundantly beneath the bark of trees and shrubs, less numerous beneath boards and stones.

Emmenastus piceus Casey. An oblong, robust, parallel species, and dark in color. Have taken this species in the mountains about Julian, at an elevation of about 6,000 feet. A less typical form occurs at Poway (elevation 700 feet).

Emmenastus obesus Lec. A small robust species, piceous-black in color, and very pruinose while living. Very plentiful about San Diego, and generally found beneath dry cow manure, or boards, rags, etc.

Epitragus pruinosus Horn. Young individuals are quite pruinose, but on account of the polished surface of the integuments, it soon wears away. Not plentiful. Have taken it in my net from *Rhus laurina*, also beneath bark at the base of rotten trees.

Zopherus induratus Casey. Occurs in the mountains about Julian, where conifers and oaks are plentiful. The species is black, robust and convex, elytra somewhat shining. Length, 16.5 mm.; width, 7.0 mm.

Phlœodes diabolicus Lec. An oblong, indurate species, common in timbered districts. Have observed the larva and pupa in the rotton stumps of *Quercus agrifolia*. The adult insect feeds upon a large and tough species of fungus which grows upon the oak. Once I took thirty specimens from one large fungus growing on an oak stump.

Noserus plicatus Lec. Occurs beneath the bark of dead trees, in the mountains about Julian.

Anepsius delicatulus Lec. A small, elongate, apterous species. Rather common in maritime districts; have never taken it far from the coast, although it is said to occur in semi-desert regions. It varies in length from 3.5 mm. to 5.0 mm.

Nyctoporis carinata Lec. An elongate, rough insect. Elytra sculptured with several rows of sharp elevations. Occurs under the bark of trees. About San Diego it inhabits the shrubby hillsides, and can be found under the bark or leaves at the roots of the plants; also, in the sticks and debris that make up the nest of the wood-rat.

Cryptoglossa verrucosa Lec. An interesting form which occurs in the desert region of the county.

Centrioptera asperata Horn. Rare. Occurs at Poway and is nocturnal in its habits.

Microschatia inæqualis Lec. A robust, apterous species. Plentiful throughout the county. Occurs in spring, beneath boards, rocks, etc. Travels about during the day.

Asida ægrota Lec. Inhabits the desert region. Active at evening.

Asida obsoleta Lec. Occurs in the valleys of the central portions of the county. It is said to have been found at San Diego, but I have never observed it so near to the coast.

Asida muricatula Lec. Abundant at San Diego in August, beneath dry cow manure, boards, stones, and old tin cans. The domestic fowl have caused it to retreat to uninhabited districts.

Asida angulata Lec. Common throughout the county. A large black species, resembling *Eleodes* but quickly recognized by the angulate sides of the prothorax.

Coniontis elliptica Casey. Although this form is considered identical with *robusta*, I believe in its validity. The typical *robusta* occurs at Santa Barbara. A careful comparison of the two forms ought to convince the most skeptical as to their being specifically distinct.

Coniontis subpubescens Lec. Occasionally met with. Conspicuously pubescent. Length, 9.2–10.8 mm; width, 4.2–4.8 mm.

Coniontis parviceps Casey. Common about San Diego. Conspicuously pubescent. Length, 7.0–8.0 mm; width, 3.4–4.0 mm.

Coelus globosus Lec. Common in the sand dunes along the seashore. A species that varies greatly in form and size; probably some are valid species.

Eusattus reticulatus Say. There are undoubtedly two distinct species about San Diego. One form, which I consider the present species, has the broad prothorax of its immediate congeners; the other has a narrower prothorax with rather strongly convergent sides, relating it to *muricatus;* the epipleural characters agree with the present idea. The elytral sculpturing in the two forms is different; in the former the surface is raised into a net-work of ridges, while in the latter the surface is quite smooth, although there is a tendency to rugulosity. This form may be *difficilis.* Specimens have been identified for me by Dr. Horn, who pronounced them *reticulatus*; similar specimens were pronounced *difficilis* by Thos. Casey; in both instances they were the specimens with broad thoraces. Somebody is wrong—a problem for the future.

Eleodes quadricollis Esch. A form referred to this species is com-

mon throughout the county. Typical specimens in my collection were collected at San Francisco.

Eleodes gentilis Lec. Very abundant at San Diego.

Eleodes interrupta Blais. Related to the preceding species, but differing widely from it in elytral sculpturing. Rare. Occurs at San Diego.

Eleodes femorata Lec. Very rare. Occurs about San Diego Bay.

Eleodes grandicollis Mann. A large species, moderately common throughout the county.

Eleodes gigantea Mann. A large elongate species, met with in all parts of the county that I have visited.

Eleodes acuticauda Lec. Common, especially in the interior.

Eleodes laticollis Lec. Moderately common at Poway.

Eleodes parvicollis Esch. Moderately evenly distributed.

Eleodes parvicollis var. *producta* Lec. Plentiful about San Diego. Inhabiting the shrubby hill-sides. They frequent the wood-rats' nests.

Eleodes marginata Esch. Moderately rare.

Cerenopus concolor Lec. Common in the eastern portion of the county.

Cerenopus costulatus Horn. Less common than the preceding species, and inhabiting the same region.

Eulabis pubescens Lec. Common everywhere. Frequents the vicinity of ants' nests.

Eulabis laticornis Casey. Rare. Occurs at Poway, beneath rocks near ants' nests.

Eulabis rufipes Esch. Common. A small species found beneath debris and bark of trees and shrubs. Evenly distributed.

Eulabis obscura Lec. A dark, depressed species, occurring plentifully along the seashore.

Amphidora littoralis Esch. Common in some localities in the interior. Frequents groves and is found beneath rocks, logs, and bark. The name is a misnomer, as I have never observed it along the seashore.

Amphidora nigropilosa Lec. Occurs along the seashore and in

regions immediately adjacent. Common on alkaline flats beneath any object upon the ground. Immature individuals while the integuments are yet soft, ascend small plants in the warm sun during the day, undoubtedly to hasten the hardening of the skeleton.

Cratidus osculans Lec. Common throughout the county. Frequents ledges and timbered districts. At Coronado they are plentiful in wood rats' nests, and about the roots of *Rhus integrifolia*. The species is clothed with moderately long hairs of a pale tawny yellow color.

Cratidus fuscipilosa Casey. Occurs on the summits of the mountains about Julian. Have found them very abundant in ledges and piles of loose rocks. Clothed with long, erect, piceous black hairs.

Stenotrichus rufipes Lec. Moderately common. Varies greatly in size; the male is frequently a mere pigmy, 5.0 mm. in length, while the female may be 8.0 mm. long. Found beneath bark, debris about bushes, etc.

Cibdelis blaschkii Mann. Inhabits the timbered and mountainous districts. Found beneath the bark of trees.

Adelina lecontei Horn. Not common. Sometimes met with in immense numbers under decaying and fungus-covered bark of dead sycamores. A depressed, reddish-ferruginous colored species.

Ulus latus Blais. Rare. Occurs along the San Diego River. Clothed with rather long, moderately slender, recumbent hairs. Elliptical in form and strongly convex.

Ulus crassus Lec. Common. Sometimes exceedingly abundant in March along the San Diego River. Oblong-oval in form, clothed with short, robust, dense hairs.

Blapstinus longulus Lec. Occurs under rocks on the mesas about San Diego. This species has an elongate, parallel, depressed form. The pubescence is short and sparse. The wings are moderately well developed, extending nearly to the apex of the elytra.

Blapstinus dilatatus Lec. Common, but not abundant. Rather evenly distributed. Prefers lowlands and timbered districts. Oblong in form, pubescence rather stout, subrecumbent, moderate in length. The wings are well developed; flight somewhat labored.

Blapstinus rufipes Casey. Common everywhere. Frequently pruinose Pubescence fine, rather long, very inconspicuous. Wings rather rudimentary, about two-thirds as long as the elytra.

Blapstinus brevicollis Lec. Plentiful in the valleys and lowlands near the coast. Oblong-oval and rather depressed in form. Pubescence fine and recumbent, inconspicuous. Wings well developed, longer than the elytra.

Blapstinus coronadensis Blais. Rather common at Coronado, moderately rare elsewhere. Elongate-oblong in form. Pubescence rather conspicuous, somewhat long, recumbent, and pale flavate in color. Wings well developed, about one-third longer than elytra.

Blapstinus pubescens Lec. Moderately common about San Diego Bay on the semi-alkaline flats. Pubescence very conspicuous, moderate in length, recumbent, and ashy in color. Wings well developed and longer than elytra.

Blapstinus sulcatus Lec. Common in the valleys and low lands about San Diego. Pubescence squamiform and robust, subrecumbent. Wings well developed.

Conibius parallelus Lec. Rather common about San Diego and Poway. A small, slender, convex insect, black in color and generally pruinose. Apterous.

Conibius sulcatus Lec. Common. Strongly convex and oblong-oval in form, black in color and generally pruinose. Occurs beneath stones and other material upon the ground.

Tribolium ferrugineum Fab. Rare, occasionally met with beneath bark of trees. A small, moderately depressed, ferruginous species.

Gnathocerus cornutus Fab. Common in ground cereals. Have observed it in all stages of development in "germea" of the stores; usually associated with *Silvanus surinamensis*. The species is elongate-oblong and depressed in form, ferruginous in color.

Aphanotus brevicornus Lec. Rather common in the eastern portion of the county. In this species the eyes are completely divided.

Aphanotus parallelus Casey. Not uncommon in the mountains about Julian Occurs beneath the bark of trees. Eyes not completely divided.

Cynæus depressus Horn. Common at Poway. Lives in the decaying roots of *Yucca whipplei*. Elongate-oval and very depressed in form.

Phaleria rotundata Lec. Exceedingly abundant on the sea-shore beneath kelp. Testaceous in color.

Platydema oregonensis Lec. Occurs in the mountains about Julian, on fungi which grow on old stumps and trees.

Apocrypha anthicoides Esch. Rare. Occasionally taken from beneath rocks or decaying melons; also, from beneath the bark of trees and shrubs. An elongate, wingless species resembling an anthicid.

Apocrypha dyschirioides Lec. Quite rare. Similar in habits to the preceding species.

Helops bachei Lec. Moderately rare. Occurs along the seashore beneath the beach-berry and Œnothera.

Helops blaisdelli Casey. Moderately common in some localities beneath maritime plants growing on the sand dunes along the seashore, near San Diego.

A ROCKY MOUNTAIN BOTANICAL TRAMP.

BY F. D. KELSEY.

On June 27, 1892, a party of eight left Helena, Montana, for a botanical trip to the top of the main range, fifteen miles away. The party consisted of the writer and wife, H. M. and E. N. Brandegee, the wife and daughter of a prominent Helena capitalist, and two young ladies of botanical proclivities. The journey lay along a gulch for several miles where we found in bloom on this date *Ranunculus Cymbalaria, abortivus, sceleratus, affinis and Pennsylvanicus. Delphinium Menziesii* peeped out at us from beneath shrubs, always tempting a botanist to get out and gather each fresh specimen, though he knows he has more than he needs already. Coulter gives its range as "Wyoming, Montana and northwestward." Its deep blue color is charming and attractive and holds well in pressing. In this immediate region it is our only Delphinium.

Along the sides of the gulch now and then could be seen the humble but winsome *Berberis repens*, most of the plants which grow in great profusion being at this season out of bloom. Its yellow roots have considerable reputation for medicinal quality under the erroneous name of Oregon Grape.

Corydalis aurea, modestly hiding its curious blossoms under a bank or a profusion of leaves, nevertheless was eagerly seized by

many hands. Prof. Coulter reports var. *occidentalis* as the more usual one from this region, but Helena must be an exception for ours is the type.

Of mustards met with that day the following may be recorded: *Draba alpina* var. *glacialis*, *Draba nemorosa* var. *hebecarpa*, *Arabis perfoliata*, *spathulata*, *Drummondii* and *Holbœllii*, *Erysimum asperum* and *parviflorum*, *Sisymbrium canescens* and *linifolium*. This *linifolium* is a beautiful plant, glabrous, and every part of it made on the plan of straight lines. Coulter gives it as of very narrow range. It would grow as a luxuriant weed, but has never as yet been troublesome. *Sisymbrium canescens* may well be classed as one of our local, troublesome weeds, and in early spring is much infested by a fungus.

Vesicaria alpina was just going out of bloom, while in cultivated fields *Camelina sativa* is thriving at an alarming rate. It has been introduced through wheat and oat seeds.

Capsella Bursa-pastoris is cosmopolitan and is found all over our state, along roadsides, streets, fence corners and cultivated grounds. *Lepidium intermedium* is native, abundant and something of a weed.

Our most common violets are *Viola canina* varieties *sylvestris* and *adunca*. *V. cuculata* is said to be sparingly reported from the Rocky Mountain region, but it has been gathered at Helena, Deer Lodge, Bozeman, Anaconda, and the Belt Mountains, all in Montana. *V. Canadensis* is plentiful, and also *V. Nuttallii*. Since the date of this expedition the writer has gathered *Viola biflora* at Granite, Montana, at an elevation of eight thousand feet.

Cerastium arvense was abundant and *Stellaria longifolia* and *longipes* were plentiful, while *Arenaria congesta* var. *subcongesta* was just beginning to flower. *Lewisia rediviva*, locally called "Bitter root," was blooming profusely. It is a portulaca, with linear fleshy leaves lying flat on the ground in a perfect circle of 2½ to 3½ inches diameter. These leaves usually have disappeared by the time the bloom appears, so that the flowers seem to lift their rosy colored heads out of the bare, sandy plains. The bloom is wondrously cheery on a bright sunny morning. The roots are thick, covered with a deep red epidermis, and have a slightly bitter taste. When dried and pounded into a meal they make a very nutritious and acceptable diet, formerly much used by our Indians.

The hillsides in many places revealed the home of our wild flax,

Linum Lewisii, which gives promise some day of being of considerable commercial value.

Negundo aceroides grows luxuriantly all over this region and is a favorite tree for front yards in the city of Helena.

Rhus aromatica var. *trilobata* was found growing up little gullies, but had just gone out of bloom.

Thermopsis rhombifolia and *montana* were not found on this trip or region; but the writer knows that they were both in bloom at this time on regions but little remote from the range of the trip.

Lupinus leucophyllus surprised us by showing its blue racemes much earlier than was expected.

Astragalus caryocarpus was found both in bloom and in fruit, its large globular juicy pods giving promise of service as food for man: it is reported from some sections as used for pickles.

Astragalus Canadensis was only in bud; as also *A. adsurgens*, *hypoglottis*, and *Drummondii*.

Astragalus Missouriensis is very common on our plains, and always attracts the botanical eye both for its beauty of bloom and grace of pods. It clings close to the soil in its struggle for existence on our hot waterless plains.

Astragalus Purshii was abundant in fruit, but its bloom had gone. The bloom is very scant, yellow; but the pods are turgid and covered with glossy white long wool, giving them a very strange appearance as they lie flat upon the ground.

Astragalus triphyllus is also to be found on these gulch sides, but at this season out of bloom. One strange experience belongs to the writer, namely: while he has seen this plant by the thousands in bloom, he has never yet gathered it in fruit. Many a time has he bent down to search for its fruit, but thus far in vain.

Astragalus inflexus was seen, but not in bloom. *Astragalus bisulcatus* and *flexuosus* were just beginning to open.

Oxytropis lagopus was in full bloom, as also *O. Lamberti*, our dreaded "loco weed." Besides these the writer knows to be in bloom at this time in other regions of the State *Oxytropis nana*, and nearly ready to bloom *O. deflexa* and *splendens*.

Hedysarum boreale is also in bloom, but our specimens instead of being purple, as says Coulter's description, are invariably creamy white. Later, the writer finds this growing plentifully at an elevation of 8,300 feet.

Prunus demissa greeted our eyes frequently along the stream we were following.

Purshia tridentata was out of bloom until we came to the higher regions, and there we found the leafless bushes one mass of yellow, fragrant bloom; at places the mountain sides seemed golden as they were covered with this luxuriant plant. It is every way worthy of cultivation.

Geum strictum and *triflorum* were frequently found, the latter always attracting attention, both in bloom and fruit. The flowers appear like drooping buds, and the erect plumose fruits are lovely and graceful waving in the sunshine.

Fragaria Virginica var. *Illinoensis* was very abundant on mountain sides and parks.

Of the Potentillas we met *glandulosa*, *Norvegica*, *rivalis* var. *millegrana*, *Pennsylvanica*, *Hippiana*, *gracilis*, and *Auserina*. *Rosa Sayi* and *Arkansana* were in bud, with here and there a bloom.

One good sized tree of *Cratægus Douglasii* was met on the mountain side in gorgeous bloom; mixed with the surrounding pines and fir it seemed like a vase of Nature's own setting.

Amelanchier alnifolia was mostly out of bloom and in fruit.

As we climbed the mountain top we found *Geranium incisum*, and *Richardsoni*, *Acer glabrum*, *Trifolium eriocephalum*, *Rubus strigosus*, and *Astragalus campestris*.

In a bog on the mountain top we gathered fine specimens of *Saxifraga integrifolia*, and *Camassia esculenta*, whose fine bulb is delicious and nutritious, and ought to be experimented upon as giving promise of a new and valuable food product for our markets.

The delicate *Tellima parviflora* was eagerly gathered. *Heuchera cylindrica* and *parvifolia* we found everywhere on the mountain sides.

Philadelphus Lewisii was just making its appearance, and will soon become valuable for export all over the United States as a much prized shrub for lawns and gardens.

The Ribes met with were *R. oxycanthoides*, *lacustre*, *Hudsonianum*, *cereum*, *viscosissimum*, *floridum*, *sanguineum* var. *variegatum* and *aureum*. *Ribes viscosissimum* is a valuable low shrub, very fragrant. Its range is very restricted.

Musenium trachyspermum, *Sium cicutæfolium*, *Osmorrhiza nuda*, and *occidentalis*, *Zizia cordata*, *Pseudocymopterus bipinnatus*, *Peuce-*

danum simplex, and *Leptotænia multifida*, and a Peucedanum not yet identified, were our finds in Umbelliferæ.

Cornus stolonifera was in full bloom along the brooks.

Sambucus melanocarpa was in fine bloom upon the top of the range, and brought vividly to mind my honored friend Prof. E. L. Greene, who by this time I hope has forgiven me for tempting him one August to taste the rich fine black fruit. I took to my heels—he after me. I know of no animal that uses these fine appearing berries. Probably, also, Prof. Greene has discarded their use!

Valeriana sylvatica and *edulis* are just passing into fruit.

Aplopappus acaulis var. *glabratus* was just beginning to bloom, while *Townsendia Parryi* was in its prime and delighted every one whose good fortune it was to gather it. This plant is gorgeous and makes one of the finest of bouquet flowers as well as garden plants. The day is coming when horticulturists will "go wild" over it.

Townsendia sericea has wholly disappeared at this season.

Erigeron macranthus, *glabellus*, *compositus* var. *trifidus* met our gaze. *Antennaria dioica* was abundant, but *dimorpha* had disappeared. *A. Carpathica* was gathered, as also *Anaphalis margaritacea.*

Balsamorrhiza sagittata is exceedingly abundant in this region, but is out of bloom at this season except at high altitudes. *Chænactis Douglasii*, *Actinella acaulis*, *Gaillardia aristata*, *Achillea millefolium*, *Arnica cordifolia* and *alpina* rewarded our search, as also *Senecio canus* and *aureus*.

Microseris troximoides, *Crepis elegans*, *runcinata*, *acuminata* and *occidentalis* were in bloom, as also *Troximon glaucum.*

Taraxacum officinale var. *alpinum* grew sparingly on the top of the range.

Campanula rotundifolia was very abundant, as also *Arctostaphylos Uva-ursi.*

Dodecatheon Meadia in several varieties was found just going out of bloom. *Douglasia montana* was in fruit.

Androsace septentrionalis and *occidentalis* were sparingly found here, though near by they grow profusely. *Glaux maritima* is abundant on our damp plains. A few specimens were found of *Frasera speciosa*, which grows profusely in the mountains west of the main range.

Phlox muscoides, *canescens*, and *Richardsoni*, were all out of

bloom; *longifolia* was just getting beyond its prime. *Gilia spicata* was not found on this trip, although it was in bloom near by.

Phacelia circinata, *Franklinii*, *sericea* and *Menziesii* were all in bloom though not all found by our party on that excursion. *Echinospermum floribundum* and *Redowskii* were in bloom, while *Omphalodes Howardi* was in fruit. *Krynitskia glomerata* was in fine condition. *Mertensia oblongifolia* had passed into fruit, but *Sibirica* was in prime condition. *Lithospermum pilosum* and *angustifolium* had gone to fruit. *Collinsia parviflora* was past its prime. The Pentstemons in bloom were *acuminatus*, *cristatus*, *confertus* var. *cæruleo-purpureus*, and one as yet unidentified. *Synthyris rubra* had gone to seed. *Castilleia mineata* and *pallida* were sparingly found. *Plantago eriopoda* was plentiful on the plains. *Eriogonum umbellatum* was just coming into bloom, and *Shepherdia Canadensis* going out of bloom. *Betula occidentalis*, *Alnus viridis*, *Salix longifolia*, *flavescens*, *rostrata* and *Populus tremuloides* lined the brook sides.

Cypripedium parviflorum, *Iris Missouriensis*, *Sisyrinchium mucronatum*, *Camassia esculenta*, *Smilacina amplexicaulis* and *stellata*, *Fritillaria atropurpurea*, *Erythronium grandiflorum* var. *minor*, *Streptopus amplexifolius*, *Prosartes trachycarpa*, *Zygadenus elegans* were the liliaceous flowers in bloom. *Leucocrinum montanum* and *Fritillaria pudica* had long disappeared.

Of Conifers we met *Juniper communis*, *Pseudotsuga Douglasii*, *Pinus flexilis* var. *albicaulis*, *Pinus ponderosa* var. *scopulorum*, and *Pinus contorta* var. *Murrayana*.

INSECTS FREQUENTING YUCCA BLOOMS.

BY C. H. TYLER TOWNSEND.

Any obsevations, however imperfect, relating to insects found frequenting the flowers of the various species of Yucca, are of much interest and value, in view of the attention which is being given to this subject by Dr. Riley, Prof. Trelease, and others.

It is believed by many persons now, since Dr. Riley first advanced the idea some years ago, that certain species of Pronuba, a genus of of small moths, are more or less indispensable to the fertilization of the Yucca flowers. Moreover, the benefit between the moth and the plant is believed to be mutual, inasmuch as the moth deposits

her eggs in the ovary of the flower and the larvæ bore in the green seed-pod. The moth has been observed to convey the pollen from the anthers to the pistil by a special act, as though impelled by reason or instinct, that the fruit might not fail to be fertilized and thus afford food for her larvæ. Whether, however, no other insects are able to fertilize these flowers is a mooted question. The Pronuba works in the evening only, and thus necessitates the employment of a dark lantern, a stepladder, and a great portion of the night spent on plains or mesas, in order to intelligently investigate its operations. As I have not been so situated that I could spend the proper time in the evenings on this work at the proper season, my observations have been made wholly in the day time. Therefore I have not observed the Pronuba moth at all, but have made, however, a few notes on the larvæ found in the pods as well as on other insects found in the flowers.

In the first place I should say that what is here recorded was observed in the vicinity of Las Cruces, New Mexico; and that our native Yuccas belong, as far as can be at present determined, to two species. We have *Yucca angustifolia;* while the other is a broad-leafed species at first supposed to be *Yucca baccata*, but which may prove to be *Y. macrocarpa*, in case the latter is a valid species. Mr. W. H. Evans, now of the Agricultural Department in Washington, gave me the above information and is now engaged looking up the matter.

COLEOPTERA.

Carpophilus niger Say, a small beetle belonging to the family Nitidulidæ, very plentifully infests the (flower) stalk buds of *Y. macrocarpa* (?) before the stalk has appeared, about the last of March or first of April. They eat holes in the outer covering and inside portions of the large flower stalk, which at first has the appearance of a bud in the center of the plant. They are also found later in the flowers.

Epicauta cinctipennis Chev. (?) Adult blister beetles, very much resembling this Mexican species, were found in the blooms of *Y. macrocarpa* (?) by Prof. Wooton, of the New Mexico Agricultural College, May 15, 1892. Several specimens were collected.

A ryhncophorous (?) larva was found, May 15, 1891, in the tip end of a pod of *Y. macrocarpa* (?) which had been picked May 10. It is a small white larva, apparently coleopterous, nearly 5 mm.

long, very chunky, and was taken from a little cavity in the extreme tip or distal end of the fruit.

LEPIDOPTERA.

Pronuba (?) larvæ. What are undoubtedly larvæ of a species of Pronuba were found May 15, 1891, in pods of *Y. macrocarpa* (?). Four pods, picked May 10, showed two infested. A whitish lepidopterous larva was found eating through the white seeds, usually in the stem or proximal end of the fruit. Three were found in one pod, two being in the same tier of seeds. Out of 21 pods of this Yucca picked May 15, only five were found infested. Some pods contained several larvæ, in one case located near the tip or blossom end. Nine large larvæ, averaging over 10 mm. in length, and two small ones about 5 mm. long, were extracted from these pods (25 pods).

DIPTERA.

A small black acalyptrate muscid, apparently belonging in or near the family Phycodromidæ, is very abundant on the flowers of *Yucca macrocarpa* (?) throughout its blooming period. In fact this fly is about the only insect to be found plentifully in the flowers through the day, so far as I have seen. Specimens were collected April 4, 1891. It is about 3 to 3.5 mm. long (body length), while the wings are 3.5 to 4 mm. long.

Sarcophaga spp. I have also noticed, in April and May, several species of Sarcophaga frequenting the flowers of this Yucca in the day time. They are often quite numerous on and about the flowers, but doubtless have nothing to do with the fertilization of the latter.

BIRD NOTES FROM ALAMEDA COUNTY.

BY F. O. JOHNSON.

WESTERN ROBIN. *Merula migratoria propinqua*. — On the morning of December 6, 1891, while pursuing a Townsend's sparrow which had flown to the top of a tall growth of jasmine, I noticed on the opposite side of the bush a strange bird moping in the shade. It observed me just as I saw it, and hopped sluggishly to another branch putting a bough between us. I thought I was acquainted with all the birds of this region, but this dusky stranger was altogether unknown to me. My first impression was that it might be

a catbird which had strayed from his rightful home. I crept up cautiously for I only had a small 22 calibre cane-gun, and easily approached within twenty feet. It made no note and did not pay the least attention to my maneuvers. When I killed it, I was still more puzzled, for it was totally different from anything I had ever seen. It appeared much like some European thrush.

The prevailing color is a dark hair brown varying to lighter or darker on different regions of the body. The top and sides of head, back, wings, tail and under-tail coverts are a uniform dark hair brown; throat somewhat streaked with ashy after the pattern of our robin, but the black streaks of the common bird are replaced by brown and the white by ashy; jugulum conspicuously washed by dark rusty, abruptly terminating at the belly with faint indications of a black band as in Hesperocichla; feathers of belly broadly edged with ashy; flanks washed with rusty, with short ashy streaks effected by the shafts which are of an ashy color, with often slight margins of the same on each side; bill of same, dark brown color; tarsi and feet also darker.

The bill is less notched than ordinarily in robins. This, together with the peculiar disposition of the rusty wash, at first made me rather chary in referring the bird to Merula, but on closer inspection it seems to be undoubtedly a rare melanistic plumage of our western robin. In taking on this singular phase, it has departed from the disposition of color seen in the ordinary bird as will be seen by the following: The top of head is no darker than the rest of the back; the black and white streaks of the throat of the ordinary bird are replaced by close irregular streakings of dark chocolate over an ashy ground; the rusty wash of the jugulum, instead of following clear down the belly to tail coverts, terminates abruptly at the breast, and gives way to an ashy cast which continues to the vent. The under-tail coverts, instead of being the lightest part of the bird's coloration, is as dark as elsewhere, and there is no trace of the white tips on the outer tail feathers. The downy under plumage is also darker than in the common bird.

These singular departures from the general tone of a robin are inexplicable to me, and at first made me doubtful in calling the bird a robin.

Although a few melanistic phases have been recorded of the eastern species, this is, I believe, the first specimen of a melanistic western robin recorded.

CALIFORNIA CREEPER. *Certhia familiaris occidentalis.*—On the 13th of November, 1892, I observed a California creeper in the tall cypress trees at Berkeley, in the grounds of the University. This is the first record of the creeper, I believe, for the county. The grounds are peculiarly adapted for this bird, there being large cypress, eucalyptus, pines and oak trees on the premises. On the following morning, while strolling through the same vicinity, a creeper was shot not over one hundred yards from where I had observed it the day before. It was probably the same bird, for close searching failed to find another and I have not seen once since.

RED-BELLIED NUTHATCH. *Sitta canadensis.*—This nuthatch has generally been regarded as an uncommon visitant of the vicinity of Berkeley and Oakland, yet in November I observed them five or six different times and in the winter months I could find a pair almost any day about the pines of the University. They were nearly always associated in pairs and frequently would maintain for many minutes that monotonous call so peculiar to the nuthatches. The last I heard them was near the first of May.

BLACK-THROATED GRAY WARBLER. *Dendroica nigrescens.*—One bird was seen by me hopping in a cypress tree at Berkeley, abut the 1st of November. I know of no previous record for the county. Though a passing migrant, it appeared perfectly at ease, and in no hurry to leave the spot.

TOWNSEND'S WARBLER. *Dendroica townsendi.*—During last fall I saw four of these rare birds, two of which I secured. On the 24th of November, I secured a male in full plumage. He was lively and uttered a short call-note from time to time. I only wounded him the first time I shot and he made some short quick chirps and another bird flew to the top of the tree and responded. It was probably a female, but as it kept out of range of my little pistol I was unable to secure it. When I shot the male the second time it flew away, and I could not find it again. Out of six I have seen taken in California, this is the only one that is in full adult plumage.

ZONOTRICHIA ALBICOLIS IN CALIFORNIA.

April 22, 1892, I shot a fine male near Stockton, which makes, I believe, the third specimen taken in California. L. BELDING.

NOTES ON SCIURUS FOSSOR Peale.

BY F. STEPHENS.

In southern California the California gray squirrel is found only in the pine region, and principally in the lower part of that region where oaks are interspersed among the pines. My acquaintance with the species in life is confined to San Bernardino and San Diego counties, where I have seen it as low as 4,500 feet altitude and as high as 8,500.

In southern California this squirrel does not hibernate, though probably not coming out of its nest in very stormy weather. It does not appear to store up much food for use in stormy weather, but depends mainly on foraging even in winter. Their homes appear to be hollows in trees all the year through. These are lined with leaves, strips of bark, etc. The nests composed of twigs with the leaves on them, seen in the tree tops, are used for bringing forth and rearing the young, though perhaps used by adults in the heated term. June 23, 1885, I obtained a female and four young from such a nest. The nest was in the summit of a large mountain alder, growing along a stream on the south side of Grayback, the highest peak of the San Bernardino Mountains, at about 8,000 feet altitude. The surrounding forest was principally large yellow pines and evergreen oaks. These young were yet blind and their pelage was so short as to scarcely hide the skin.

The breeding season is rather long. In my notes I find records relating to the breeding of this species as follows: March 25, four females shot, one with three embryos, one with two, one with one and one with none; May 28, a female taken which appeared to have reared young recently; June 23, female and four young taken as mentioned above; July 3, one female taken was suckling young and another contained two small embryos; July 5, female taken contained one half-grown embryo.

As far as these records go they show the number of young to be one to four, with two and three as the usual number. They may be taken as indicating the rearing of young twice a year, but I feel in doubt of this being the case. As I have taken ungrown specimens in spring I think it takes a year at least for individuals to grow to maturity. As the species does no harm to crops and is fair eating it should be protected, at least during the breeding season.

This squirrel varies in abundance in the same locality in succeeding years without apparent cause. Some hunters think it is subject to epidemics, which is probable. Last March I picked up one dead that on skinning showed no wound. It was much congested, so that the veins all over the body were very distinct. It was in fair condition for the season, so its disease was not of long standing

The seasonable variation of this species consists of the addition in winter of an ochraceous or cinnamon-rufous wash over the upper surface, principally over the shoulders, but often extending from the neck to the rump. In some winter specimens this wash is quite strong, but in others it is hardly appreciable. This difference in color is only in the next to the last annulation of the hairs of the upper surface. These annulations in summer are nearly pure white but in winter they become more or less rufous colored. The last, blackish annulation or tip, being short, does not much obscure the color of the lighter band below.

A comparison of specimens from San Bernardino and San Diego counties with specimens from near San Francisco in the collection of the Academy of Sciences shows the southern squirrel to be intermediate between the two forms found near San Francisco. I hardly know whether to refer the southern animal to *Sciurus fossor* or to Mr. Bryant's new sub-species *nigripes*. It may even need separation sub-specifically from both, as it is certainly a little different in color from either. The southern animal is quite constant in color except the presence of the ochraceous wash on the dorsal surface of some in winter.

I have not been able to consult Audubon and Bachman's original description of *Sciurus leporinus*, which has been discredited by most later authors, but from Baird's reference to it I am inclined to think that it was founded on a northern California individual having an unsually strong wash of ochraceous or chestnut on the upper surface, about the color that I should expect to see on winter specimens from, say, Humboldt. It is probable that *leporinus* will ultimately be restored and *fossor* of Peale be placed in the list of synonyms.

SOME OF THE METHODS AND IMPLEMENTS BY WHICH THE PACIFIC COAST INDIANS OBTAINED GAME.

BY L. BELDING.

The bow and arrow was here, as in most parts of the globe, a standard weapon of the natives. The spear was also an important implement of destruction, judging by the numerous carefully made spearheads which are so widely distributed in and on the soil.

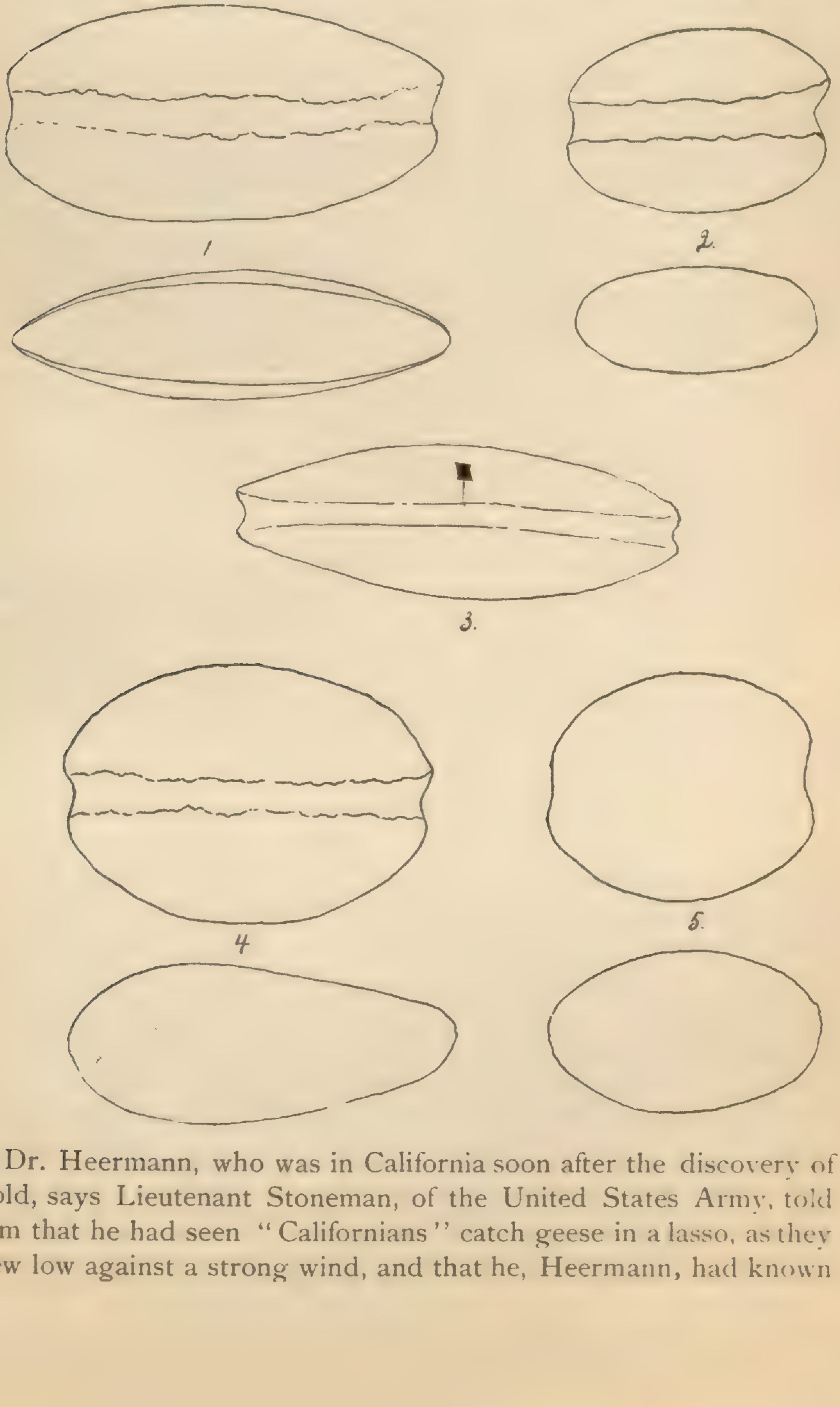
Perhaps next to these in importance, in California at least, were the sling, or throwing stones. This is mere conjecture, for, while the grooved and perforated stones of this State are well known to ethnologists, but little is known concerning them. As they are so often turned up by the plow, they were probably in use at no distant day. The Mexicans who first came to California must have had good opportunity to learn the use of these stones—much better than the Americans who came later. They were probably extensively used in killing ducks and geese. Some partially flattened, bevelled, and pointed, grooved stones, which are found in Butte County, appear to indicate that two or more were tied to a common center and thrown together just as they were thrown in Alaska, as described by Mr. Turner. Other forms were probably thrown singly. In the large tule marshes where water fowl must have been swarming, as is still the case a portion of the year, and in other stoneless tracts, the hunter must recover the stone or his occupation would soon be gone. It would be almost impossible to recover it if it fell in the dense tule thickets or ponds unless a string was attached to it. It may have been a long string, one end of which was held in the hand. A short string might answer the purpose if some prominent object was fastened to it—a white quill for example.

Geese and ducks were, no doubt, much tamer before guns were introduced here, but even now, on Butte Creek, when millions of geese first arrive in the fall, a thrower of average skill could kill geese in the manner I have suggested.

The accompanying figures represent the throwing stones above referred to:

Figure 1. Length 90 mm.; breadth 45 mm.; thickness 25 mm.
Figure 2. Length 52 mm.; breadth 42 mm.; thickness 28 mm.
Figure 3. Length 95 mm.; diameter 32 mm. This may have been used a pendent or charm.

Figure 4. Length 77 mm.; breadth 51 mm.; thickness 30 mm.
Figure 5. Length 55 mm.; breadth 49 mm.; thickness 40 mm.



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Dr. Heermann, who was in California soon after the discovery of gold, says Lieutenant Stoneman, of the United States Army, told him that he had seen "Californians" catch geese in a lasso, as they flew low against a strong wind, and that he, Heermann, had known

a "native" to procure seventeen geese in a single charge, on horse back, through a flock of several acres, by riding near the flock and suddenly putting spurs to his horse and striking the geese with a club. The wielders of the lasso and club were probably Mexicans, but the manner of killing the geese deserves mention here

Lieutenant Birnie, in Geographical Surveys west of the One Hundreth Meridian, describes peculiar blinds that the Indians near Death Valley made, just by springs and artificial ponds, for the purpose of killing quail and other birds. The blinds had the general appearance of beehives; were made of rushes and small boughs interlaced, with an opening for entrance on the side away from the spring. The inside was large enough to seat one person. There was a small hole on the side toward the water through which the arrow was shot. A string was attached to the arrow, and repeated shots could be made with it without alarming the game.

The Indians of Calaveras County catch mountain quail (Oreortyx) with snares of hair and twine. They make brush fences, about two feet high and from a fourth to half a mile long, leading obliquely from a creek or cañon, over a hill that is covered with a dwarfed growth of chaparral. Holes large enough for a quail to pass through are left in the fence, and in these holes the snare is placed. The birds are driven toward and along the fence, care being taken not to press them too hard. The birds are taken from the snares a little later and are usually uninjured by the snare, the loop of which is intended to catch the quail around the body in front of the wings.

I suppose these Indians sometimes caught deer in snares, having once, while following a deer-path through a thicket of small pines, found a rope-snare fastened to the top of a bent sapling and so set as to endanger any deer that might pass along the path

The Pit River Indians caught game by digging pits about six feet deep and covering them with twigs and grass. This custom gave the name to the river and tribe.

Mr. Ridgway, in Ornithology of the Fortieth Parallel, says the Indians of the Great Basin [in Nevada] made elaborate decoys of canvas-back and red-head ducks, the skins stretched over bodies of dried tules, the heads prepared and poised in a style equal to that of the most accomplished taxidermist. The floating decoy was fastened by a stone tied to a string, the other end of which was fastened to the bill.

California Indians, according to Dr. Heermann, entrapped mallards and other ducks in a weir made of willow branches, and also shot ducks with arrows from ambushes built on the shore.

Dr. Suckley, in Natural History of Washington Territory, about the year 1860, says the Indians living along the Straits of Fuca destroyed vast numbers of wild ducks by shooting with shot, and when short of ammunition with arrows; that they obtained ducks in great quantities by stretching long nets on a line suspended on poles which were about as far apart, and looked much like telegraph poles. The poles were erected on the long sand spits running out from points and dividing bays along the straits. The nets were stretched at nightfall, directly in the course of the flight of the birds as they flew from bay to bay, and from point to point. He adds that the Lummi and Skadgett Indians obtained ducks at night by fire—hunting with canoes and lights. The ducks dazzled and bewitched by the light would allow it to approach so near that they were killed with arrows and spears. It was not unusual to take a good sized canoe load in this manner in a single night.

Lucien M. Turner, in Arctic Series of Publications of the United States Signal Service, says before the natives of Alaska had guns they usually caught geese in nets, which were about three feet high and thirty feet long, on the margin of a pond. When the geese were near enough the net was thrown over them by a man who was secreted near the net. Another method was to use three rounded stones of nearly equal weight and size, generally about one and one-half inches in diameter, though they differed with each individual's strength, the women also using lighter stones than those used by the men. A groove was cut around each stone and deepened sufficiently to hold a strong thong of seal skin about twelve inches long. The three loose ends of the strings were tied together, placed in the palm of the hand, and the stones that were attached to the other ends of the strings were carefully disposed on the coiled thongs in the hand. A flock of geese that came near enough would have this "bolas" thrown at them and it was "certain to become entangled on the neck or wings of some goose which fell to the earth and was immediately secured. The women were adepts at throwing these stones. An old woman told me that she had often got two, and, occasionally, three geese at a single throw."

E. W. Nelson, in the same series, says "the wolf is trapped by

the Eskimo in a peculiar manner, which is also practised by the Eskimo north of Hudson's Bay. A piece of whalebone about eight inches long, and of the size of a flattened lead pencil sharpened at both ends, is soaked in water until it is thoroughly softened. It is then bent on itself in folds about an inch long, and is tied in this position until it is thoroughly dry. The cord is then removed and the coil retains its position. It is then covered about an inch thick with tallow and laid out for the wolf to find. The latter picks up the morsel of fat containing the whalebone, and not being able to chew it, gulps it down entire. In a short time the juices and warmth of the animal's stomach act upon the whalebone and it slowly straightens out and the sharp points transfix the stomach, and if they do not enter the heart and lungs and produce death at once they cause the animal such agony that he lies down and becomes an easy prey for the hunter who follows his trail."

There is an Alaskan bird sling in the Academy collection which is quite similar to a form described by Wood, Knight, and others. It consists of ten small pieces of ivory, each of which is pierced and fastened by a string about thirty inches long. On the other end of each string is a slender quill five or six inches long, and all of the quills are bound together with sennet.

The above, though it does not exhaust the subject, proves that the Indians of this coast were very ingenious in capturing birds and animals, and some of them were equally ingenious in catching fish. The Washoe Indians are very successful is spearing trout when the fish run up stream to spawn. They build huts of boughs over brooks, the fisherman being able to see the fish just below him from the dark interior of the hut, while the fish cannot see the fisherman. About forty years ago, when the writer was in Bering Straits and the Arctic Ocean, the favorite recently adopted harpoon of American whalemen—the so called toggle iron—was modelled after an Eskimo bone harpoon used by the natives about the Straits.

The white water lily mentioned in the Botany of California as occurring about the head-waters of Eel River has been definitely located by Mrs. E. C. Campbell, who obtained roots from a Mr. Crabtree, living a few miles from Bartlett Springs. No flowering specimens have yet been seen by botanists.

MARIPOSA COUNTY AS A BOTANICAL DISTRICT.

III.

BY J. W. CONGDON.

Before proceeding to discuss the plants of the coniferous belt, I take this opportunity to make some corrections in my former lists.

Since they were prepared, it has been my good fortune to visit San Francisco and enjoy the opportunity there to study, as well as I could in the brief time which other engagements permitted, the large collections of the Academy of Sciences, principally, with reference to the correction of errors in my determinations of our many difficult species.

In making this examination I was indebted to Mrs. Katherine Brandegee, curator of the herbarium, for valuable suggestions and assistance, which it gives me great pleasure to acknowledge.

These corrections, as will be seen, consist partly in correcting mistakes in identifying the plants themselves, and partly in making the nomenclature adopted conform to the latest and best authorities. This applies principally to the Umbelliferæ. *Podosciadium Californicum* Gray of Bot. Cal. is *Eulophus Californicus* C. & R. of Coulter and Rose's Revision of the Umbelliferæ. *Ferula dissoluta* Wats. is *Leptotænia dissecta* Nutt. *Deweya Hartwegi* Gray is *Velæa Hartwegi* C. & R. *Stephanomeria paniculata* Nutt. should be *S. virgata* Nutt.

The plant referred to as *Phacelia phyllomanica* Gray is *P. platyloba* Gray, and is also clearly the plant described by Mr. Greene under the name of *P. Arthuri*. Mr. Greene's character is taken from a single plant, evidently a waif from the foothill region, where the species is not rare.

Mimulus nanus Hook. & Arn. of the list is clearly a mixture of two and probably three species. The Mariposa plant is *Mimulus subsecundus* Gray, mingled with an apparently undescribed species of the same general habit.

In the coniferous belt, the place of these species is taken by another which, judging from careful observations made since my return, is probably the original *Mimulus nanus* of Gray, but whether Gray's plant or the present agrees with the *nanus* of Hooker and Arnott I have no means of determining.

Mimulus Pulsiferæ Gray of the list is *M. floribundus* Dougl., and the plant so designated in the list is yet undetermined.

Fritillaria atropurpurea Nutt. should be *F. parviflora* Torr.

THE CONIFEROUS BELT.

As we go eastward from Mariposa we gradually ascend, and at a distance of about ten miles we meet the western or lower edge of this zone. The line of demarkation here is quite plain and is indicated by the commencement of the continuous pine forest, and also by the appearance of the so-called bear clover *(Chamæbatia foliolosa)*. This plant begins with the pine forest at about 3,000 feet, and forms a nearly continuous elastic mat about a foot deep under the trees, extending nearly or quite to the upper line of this zone, at about 6,000 feet. This upper boundary is not as clearly marked as the lower one, but is here understood to coincide with the line which bounds the territory inhabitable throughout the year. Above 6,000 feet the country, though beautiful and furnishing the most delightful and healthful summer residence in California, is usually covered in the winter with snow to a depth which practically makes a winter residence impossible, and hence excludes any permanent population. The subalpine zone, as here indicated, consists principally of certain high plateaux hereinafter described lying between the principal mountain ridges and of the great intervening valleys formed by the rivers, while all that portion of the heavily wooded zone which lies below is included in the Coniferous belt.

The forest, which, originally at least, covered substantially the whole of this belt and still covers by far the greater portion of it, consists principally of yellow pine *(Pinus ponderosa)*, but the cedar *(Libocedrus decurrens)* is everywhere common, without occupying any tract exclusively. At about 4,000 feet, the white spruce *(Abies concolor)* and the Douglas spruce (*Pseudotsuga Douglasii)* begin to be frequent along the streams, while the sugar pine *(Pinus Lambertiana)* becomes abundant on the upper slopes.

The magnificent size and the perfection of growth which all these trees here attain are not surpassed in California. Oregon, even, can hardly show more noble specimens or more valuable tracts of timber.

The deciduous trees in this zone are not usually conspicuous either for number or size, but the golden cup oak *(Quercus chryso-*

lepis) is often a marked exception. Single trees of this species are often found which, in size of trunk, in wide expanse and symmetry of growth, vie with the noblest oaks of the coast, while, in the beauty of the foliage and of their golden-velvety fruit, they surpass all our other species. The golden cup of the coast, indeed, is commonly but a scraggly, ungainly tree compared with the same species in our coniferous belt. The black oak *(Quercus Kelloggii)* is frequent in the woods, while along the streams the flowering dogwood *(Cornus Nuttallii)*, the alder *(Alnus rhombifolia)* and a few willows represent nearly the whole of our deciduous trees in this belt.

In the following list of species, in addition to the letters and marks previously used, Ct. indicates that the plant is also found on the coast, while Y shows that the plant is a portion of the peculiar flora of the Yosemite Valley:

Ranunculus hystriculus Gray. Wet cliffs, Merced River, Devil's Gulch, etc. Y.

Actæa spicata L. var. arguta Torr. Scarce. Ct.

Dicentra formosa DC. Rocky beds of streams. S. Ct.

Dentaria tenella Pursh. Frequent.

Streptanthus tortuosus Kell. Rocky hills. S.

Viola lobata Benth. Frequent above 4,500 feet. S.

Silene Lemmoni Wats. Occasional above 4,500 feet. S.

incompta Gray. Common. S.

Bridgesii Rohrbach. Mostly above 5,000 feet. Perhaps identical with the last. S. Y.

Sagina Linnæi Presl. Banks of streams. Occasional above 4,500 feet. S. A.

Claytonia linearis Dougl. Darrah. Local.

Limnanthes Douglasii R. Br. Wet rocks. C. S.

Ceanothus integerrimus. H. & A. Frequent.

decumbens Wats. Frequent above 4,500 feet. S.

Staphylea Bolanderi Gray. Snow Creek, Devil's Gulch, etc.

Lupinus albicaulis Dougl. vars. Various peculiar forms credited to this polymorphus species are abundant and also subalpine.

Lupinus Grayi Wats. A beautiful species frequent below 4,500 feet.

Trifolium Breweri Wats. Occasional in the woods, forming mats, more abundant above. S.

Hosackia crassifolia Benth. Occasional on clayey slopes. S.
decumbens Benth, var. (?) Nevadensis Wats. Occasional in open clayey soils. More common above. S.
Lathyrus paluster L. var. myrtifolius Gray. Frequent on hillsides below 4,500 feet.
Nevadensis Wats. Frequent below 5,000 feet.
Prunus emarginata Walp. Scarce below 4,500 feet, frequent above. S. Ct.
Rubus leucodermis Dougl. Frequent below 4,500 feet. Ct.
Saxifraga peltata Torr. Rocky beds of streams, Devil's Gulch, &c. Frequent above. S.
Ribes sanguineum Pursh. Stream banks. S. Y. Ct.
Menziesii Pursh var. subvestitum. Perhaps new species. Footman Mt. and south in the Sierras above 4,000 feet.
Sedum obtusatum Gray. Rocks. Frequent. S.
radiatum Wats. Rocky hillsides above 4,000 feet. S. Y.
Cotyledon Nevadensis Torr. Cliffs, Devil's Gulch, Hite's Cove. S.
Gayophytum ramosissimum T. & G. Moist grounds. S.
diffusum T. & G. Dry slopes. S.
Clarkia rhomboidea Dougl. Frequent in woods below 4,500 feet.
Circæa Pacifica A. & M. Wet places below 4,500.
Selinum capitellatum Benth & Hook. Banks of streams. S.
Cornus Nuttallii Audubon. Frequent above 4,000 feet. S. Ct.
pubescens Nutt. Stream banks, mostly above 4,000 feet. S.
Symphoricarpus mollis Nutt. Frequent above 4,000 feet. S.
Galium trifidum L. Scarce in wet grounds. S. Ct.
asperrimum Gray var. ? asperulum Wats. Wet thickets. Frequent. S.
Bigelovia graveolens Gray. Occasional, especially above. S.
Sericocarpus rigidus Lindl. Banks of streams below 5,000 feet.
Aster radulinus Gray. Occasional below 4,500 feet. Ct.
Erigeron Breweri Gray. Rocky places above 4,000 feet. S.
Adenocaulon bicolor Hook. Deep shade below 5,000 feet. Ct.
Antennaria luzuloides T & G. Dry slopes above 4,000 feet. S.
Balsamorhiza Hookeri Nutt. Darrah. Local. Ct.
deltoidea Nutt. Frequent below 4,500 feet.
Wyethia ovata Gray. Open grounds, frequent below 4,000 feet.
Cnicus Andersonii Gray. Frequent. S.
Microseris nutans Gray. Frequent above 4,000 feet. S.

Malacothrix obtusa Benth. Occasional among rocks in clayey soils (also at Benton Mills).
Campanula prenanthoides Durand. Dry slopes, frequent above 4,000 feet. S. Ct.
Rhododendron occidentale Gray. Banks of streams. Frequent. Ct.
Pyrola picta Sm. Frequent above 4,000 feet. S.
aphylla Sm. With the last. S. Ct.
Pterospora andromedea Nutt. Not rare above 4,000 feet. S.
Apocynum androsæmifolium L. Common below 4,000 feet.
Phlox speciosa Pursh. Bondurant Mine. Local.
Gilia grandiflora. Frequent below 4,000 feet.
linearis. Scarce. S.
heterophylla. Common below 4,500 feet.
leptalea. Common above 4,000 feet. S.
divaricata Gray. Common below 4,500 feet.
ciliata Benth. Frequent. (This has now been found in the Mariposa district.)
Hydrophyllum occidentale Gray. Not rare above 4,500 feet. S.
Draperia systyla Torr. Common above 4,000 feet. S.
Cynoglossum occidentale Gray. Not rare above 4,500 feet. S.
Solanum Xanti Gray. Occasional below 4,500 feet.
Collinsia bartsiæfolia Benth. Below 4,500 feet. Common. Ct.
Species apparently undescribed. Above 4,000 feet. Snow Creek, Yosemite Turnpike. S.
Mimulus atropurpureus Kell. (Kelloggii Curran). Occasional below 5,000 feet.
angustatus Greene. Open grounds. White & Hatch's and above. S. Ct.
bicolor Benth. Open grounds below 4,000 feet. Common.
filicaulis Wats. Snow Creek. Once found.
moschatus Dougl. Wet places, frequent. S.
Veronica Americana Schwein. Wet grounds. Not rare. S.
Castilleia miniata Dougl. Frequent above 4,000 feet. S.
Audibertia humilis Benth. Devil's Gulch at 4,000 feet. Local.
Lophanthus urticifolius Benth. Banks of streams below 4,000 feet. Ct.
Polygonum imbricatum Nutt. Wet places, more common above. S.

Salix Lemmoni Bebb. Scarce in this zone, becomes frequent above. S.
flavescens Nutt. Sweetwater, 5,000 feet and above. S.
Quercus Breweri Engelm. Scarce in the chaparral below 5,000 feet. S.
Quercus dumosa Nutt. Devil's Gulch and above. S. Ct.
Corylus rostrata Ait. Frequent at 4,000 feet.
Asarum Lemmoni Wats. Snow Creek, 3,500 feet.
Comandra umbellata Nutt. Frequent in clayey soils up to 6,000 feet and above. S.
Torreya Californica Torr. Occasional. S. Ct.
Libocedrus decurrens Torr. S.
Abies concolor Lindl. S.
Pseudotsuga Douglasii Carr. S.
Pinus Lambertiana Dougl. S.
tuberculata Gordon. Occasional south of the Merced River, abundant north of it, always near the lower limit of this zone.
Corallorhiza Bigelovii Wats. Above 4,500 feet, frequent in the zone above. S.
Habenaria Unalaschcensis Wats. Common above 5,000 feet, occasional below. S.
Spiranthes Romanzoffiana Cham. Wet places, occasional. S. Ct.
Cephalanthera Oregana Reich. f. Occasional at 4,500 feet and above. S.
Iris Hartwegi Baker. Frequent. S.
Brodiæa multiflora Benth. Frequent below 4,000 feet.
Smilacina amplexicaulis Nutt. Frequent below 4,500 feet.
sessilifolia Nutt. Occasional especially above. S.
Lilium Washingtonianum Kell. Dry slopes, most abundant above 5,000 feet. S.
Calochortus nudus Wats. Frequent at 4,500 feet and above. S.
Prosartes trachyandra Torr. Occasional at about 4,500 feet.
Juncus dubius Engelm. Wet places, more abundant above. S.
Eleocharis Bolanderi Gray. Occasional in wet grounds. S.
Carex Geyeri Boott. Dry ground. Common above 4,500 feet. S.
bromoides Schk. Wet places at about 4,500 feet.
siccata Dew. Occasional below 4,000 feet.
Danthonia Californica Bolander. Most common above 4,000 feet. S. Ct.

Trisetum canescens Buckl. Frequent below 4,500 feet. Ct.
Aira elongata Hook. Same range as last. S. Ct.
Melica bromoides Gray. Rocky places below 4,000 feet. Devil's Gulch.
Harfordi Bolander. Common. S.
aristata Thurb. Frequent, especially above 4,000 feet. S.
Poa serotina Ehrh. Darrah. Local.
Festuca ovina L. var. duriuscula. Rocky stream beds at 4,500 feet and above. S.
Ceratochloa breviaristata Hook. Frequent. S.
Adiantum pedatum L. Wet rocks. S.
Cheilanthes gracillima Eaton. Rocks. Hite's Cove and above. Y. S.
myriophylla Desv. Devil's Gulch, 3,500 feet and above. S.
Asplenium Filix-fœmina Bernhardi. Occasional. S. Ct.

Out of the 122 species enumerated above 75 or more than half extend into the subalpine region, while 24 are also found on the coast without appearing, as far as known, in the intervening territory. It is worth while to notice that of these 24 species 12 are limited to the redwood district which corresponds very closely with our coniferous belt and most of the others are probably stragglers from the same region.

Adding to these 122 species the 152 native and 40 introduced species which appear in the first list as also belonging to the coast region and the 44 native and 2 naturalized species which begin in the lower zone and extend into this, we have 360 as the number of known species belonging to the coniferous zone. The almost continuous pine forest, which, originally at least, covered the whole of this district, is no doubt the cause of the smaller number of species found here, by preventing that variety of condition and situation which is requisite for producing a great variety of vegetation. Out of the 317 native species found here 23, nearly 8 per cent., are so far as known limited to this zone.

DISCOVERY OF A NEW GROVE OF SEQUOIA GIGANTEA.

BY WILLIAM W. PRICE.

Read before the California Academy of Sciences, August 1, 1892.

While stopping with Mr. C. F. Hoffman, Superintendent of the Red Point Mine on the Forest Hill divide, in Placer county, I heard rumors of a grove of big trees situated somewhere on the Middle Fork of the American River. I could find no one who had seen the trees, and I heard various accounts concerning them. Some said they were cedars, and others said they were something new, never before seen.

On June 20, in company with Mr. Karl Hoffman, I set out in search of the supposed grove. Our trail led over the mountains, across the Middle Fork of the American River, to the old, almost deserted mining camp of "Last Chance." Here, after some delay, we found a young miner, Mr. Ferguson, to guide us to the grove. He had been there some five years before, and knew all the country.

The grove was said to lie about eight miles from "Last Chance," and we found it fully that distance. Our trail, for the most part, lay along heavily wooded ridges, where only occasionally we had glimpses of the outside country. Away to the southeast rose the snowy slopes of Mt. Tallac, bordering Lake Tahoe. The trees, for the most part, were sugar pines—lordly fellows—and during the whole eight miles we saw only one cut tree. The miner and the "shake-hunter" had never despoiled this forest. Only a few chipmunks, jays and chickadees were heard to break the grand monotony of forest solitude.

On a slight rise of ground in the forest our guide left us and proceeded on alone. He came back in a short time with the welcome news that he had found the grove. We followed him some distance down the slope over a rich carpet of pine needles, until he came to a cañon—not a very steep one—cut into the slate formation. Then we came upon the grove, the most northern known, I believe, of *Sequoia gigantea.*

Only six trees are standing, and these do not spread over an acre or two of ground. This is, perhaps, the last stand made by *Sequoia gigantea*, and for a thousand years or more this grove has beaten back the fierce onslaughts of fire, storm and cold.

The two largest standing trees are about twelve feet in diameter, the four others are smaller. One fallen tree is twenty feet in diameter at the base, and twelve feet at fifteen feet from the roots. There are other small fallen trees. There had been, years before, a much larger fallen trunk—some said twenty-eight feet in diameter—but a fire had destroyed it. The height is not great, for sugar pines standing near tower above them.

This grove is situated in Placer county, about fifteen miles east of Forest Hill, on one of the streams flowing into the Middle Fork of American River. The altitude is about 5,000 feet.

The country is without any traveled trails, and all about the grove we saw tracks of California lions, bear, deer and other animals. The grove cannot be seen until a person is within a hundred yards, for the heavy-wooded cañon sides close all about it. This, perhaps, accounts for its being so long unknown to scientists. But to the old prospectors it has long been known, for on the bark of alders growing along the creek are cut the dates of 1860, 1862, 1868, 1872, 1880, 1892, and others. I had only an hour to observe the surroundings and take measurements, so this account is very meager. I hope soon to make a more thorough examination of the "North Grove."

TUBA.

BY EDWARD PALMER.

Tuba, a beverage which is very popular in the State of Colima, Mexico, is obtained from the cocoa palm by the following process.

The fruit-bearing stems at the time the flowers are forming have their tips cut off and a gourd—sometimes two or three—hung from each, so as to catch the sap which flows freely from the wounded ends. Twice daily the liquid is collected from the gourds, a very thin slice of the stem being removed at each visit, in order to maintain the flow of sap which would otherwise soon cease from the drying of the exposed surface.

These gourds are often a source of curiosity to travelers, who wonder not only of what use they are, but how the owner gets them there. The height and slenderness of the trees prevent the use of a ladder, and the natives reach the tops by means of notches cut in

the trunk at convenient distances for stepping. By means of these and daily practice they ascend these trees almost with the ease and agility of monkeys.

The gourds are emptied by means of a short reed tube inserted just below the rim into a large flattened one fastened around the body of the climber by a strap. This gourd though very large is well adapted by its flattened shape for being carried about through the foliage of the tree. If insects or any foreign substance has accumulated in the gourds suspended in the trees they are cleaned out by means of a brush made of the interior fibrous wood of the tree which is carried in the belt for that purpose.

The knife used for freshening the ends of the shoots is much like the one used by shoemakers for trimming leather. It is sharpened on a piece of wood shaped like a whetstone with a handle. On the flat, smooth surface of this piece of wood sand is strewn and the blade being dexterously drawn a few times over its surface is sufficiently sharpened for the purpose. The flowering ends yield tuba twice daily for a year.

Tuba in the fresh state much resembles the liquid from the Agave before it becomes pulque. It is very refreshing and nutritious and has a slight taste of cocoanut, but in six hours fermentation sets in, in twelve hours it is as strong as old cider, by twenty-four hours acetic fermentation begins.

In order not to lose tuba when fermentation is far advanced many different things are added to it, and different flavors thereby given.

Some persons drink it when as strong as whisky, while others will mix the fermented juice with fresh so as to modify its strength and render it salable and to many, very palatable, but the form which commands the admiration of those who like to be under the influence of strong drink is known as

TUBA COMPOSTURA.

This is made by adding to the fermented tuba one or more of the following articles: pineapples, lemons or onions in slices, bruised pods of chile or sticks of cinnamon; these being allowed to remain in the tuba for a short time add their flavor and strength to the mixture.

A favorite drink with many is made by adding cinnamon and ground almonds to the old tuba.

These composition drinks are sold at double the price of the fresh tuba, but though much used and highly intoxicating delirium tremens is of rare occurrence.

The venders of tuba or "Tuberos" as they are called, are found in the markets and in certain other places about the streets of Colima drawing thirsty crowds who seem to have preference for the tuba offered for sale by this or that person. The cry of the tubero as he goes about the streets is a familiar one often eagerly responded to. He is an object of curiosity to strangers, wearing a yoke upon his shoulders with a rope depending from each end sustaining by hooks, large gourds filled with tuba. Immediately below the rim of these gourds pieces of reed are inserted. These serve as spouts for pouring the tuba and also to carry the small vessels made of halves of gourds of different sizes, in which the tuba is retailed. These small vessels are pierced and a string passed through, by which they are suspended from the spout when not in use. There is also carried hanging from the spout a strainer which looks like a large wooden spoon full of holes, this is to remove any foreign substance which may appear on the surface of the tuba as the vender wanders to and fro offering to his customers the smallest gourd full of the drink for a cent and the largest one for two cents.

A CHECK-LIST OF THE WATER BIRDS OF CALIFORNIA.

BY WALTER E. BRYANT.

While engaged upon some writing pertaining to the birds of California, I have found it convenient to have a list of the known species readily accessible, and have found Mr. Belding's "Land Birds of the Pacific District" so necessary that I was obliged to prepare a list of the water birds to supplement it. In this connection I have consulted all available records, and have received information regarding several species from Mr. Belding and Dr. J. G. Cooper. I have also compared it with a list compiled by Mr. Palmer two years ago. The publication of the "Water Birds of the Pacific District" having been deferred for lack of fuller information regarding the distribution of species and the times of their arrival and departure, it is hoped that those having the opportunity will give closer attention to the water birds, and make known their observations. I

should be pleased to learn of any authentic additions to this list. The species about whose occurrence and distribution in California less is known have been indicated by a (*). In regard to the geese which occur in this State, see Mr. Belding's article in the present number.

There is no record of the occurrence of the tropic bird *(Phaëthon æthereus)* beyond the doubtful one of a skull having been found on the coast of Marin County more than twenty years ago. Mr. Anthony has noted the species near Cape Colnett, and northward, probably.

1. ÆCHMOPHORUS OCCIDENTALIS (Lawr.)
2. COLYMBUS HOLBŒLLII (Reinh.)
3. COLYMBUS AURITUS Linn.
4. COLYMBUS NIGRICOLLIS CALIFORNICUS (Heerm.)
5. PODILYMBUS PODICEPS (Linn.)
6. URINATOR IMBER (Gunn.)
7. URINATOR PACIFICUS (Lawr.)
8. URINATOR LUMME (Gunn.)
9. LUNDA CIRRHATA Pall.
10. CERORHINCA MONOCERATA (Pall.)
11. PTYCHORAMPHUS ALEUTICUS (Pall.)
12. BRACHYRAMPHUS MARMORATUS (Gmel.)

*13. BRACHYRAMPHUS HYPOLEUCUS Xantus.

14. CEPPHUS COLUMBA Pall.
15. URIA TROILE CALIFORNICA (Bryant).

*16. URIA LOMVIA ARRA (Pall.) A single individual of Pallas's murre has been recorded from San Francisco Bay, in winter, by Dr. Cooper. Proc. Cal. Acad. Sci. v, p. 414.

*17. STERCORARIUS POMERINUS (Temm.) (Bryant, Proc. Cal. Acad. Sci. 2d Ser. ii, 87.)

*18. STERCORARIUS PARASITICUS (Linn.)

*19. RISSA TRIDACTYLA POLLICARIS Ridgw.

20. LARUS GLAUCESCENS Naum.
21. LARUS OCCIDENTALIS Aud.

*22. LARUS ARGENTATUS SMITHSONIANUS Coues.

*23. LARUS CACHINNANS Pall.

24. LARUS CALIFORNICUS Lawr.
25. LARUS DELAWARENSIS Ord.
26. LARUS BRACHYRHYNCHUS Rich.

27. LARUS HEERMANNI Cass.
28. LARUS PHILADELPHIA (Ord.)
29. STERNA TSCHEGRAVA Lepech.
30. STERNA MAXIMA Bodd.
*31. STERNA ELEGANS Gamb.
32. STERNA FORSTERI Nutt.
*33. STERNA PARADISÆA Brünn.
*34. STERNA ANTILLARUM (Less.)
35. HYDROCHELIDON NIGRA SURINAMENSIS (Gmel.)
36. DIOMEDIA NIGRIPES Aud.
37. DIOMEDIA ALBATRUS Pall.
*38. DIOMEDIA MELANOPHRYS Boie. Hab. "Southern seas, especially South Pacific; casual off coast of California." Ridgway.
*39. THALASSOGERON CULMINATUS (Gould).
*40. PHŒBETRIA FULIGINOSA (Gm.) No authentic record for this State, but said to extend "north (casually?) to coast of Oregon." Ridgway.
*41. OSSIFRAGA GIGANTEA (Gm.) Same remarks as above.
*42. FULMARUS GLACIALIS GLUPISCHA Stejn.
*43. FULMARUS GLACIALOIDES (Smith).
*44. PUFFINUS CREATOPUS Coues.
*45. PUFFINUS GAVIA (Forst.) One record from Santa Cruz. Proc. Cal. Acad. 2d Ser. ii, 87.
*46. PUFFINUS GRISEUS (Gmel.) One record from San Francisco. Proc. Cal. Acad. 2d Ser. ii, 87.
*47. PUFFINUS CINEREUS (Gmel.) "Accidental off the coast of California." A. O. U.
*48. DAPTION CAPENSIS (Linn.) "Accidental on coast of California." A. O. U.
*49. OCEANODROMA FURCATA (Gmel.) (Palmer, Proc. Cal. Acad. 2d Ser. ii, 88.)
50. OCEANODROMA HOMOCHROA (Coues).
*51. PHALACROCORAX DILOPHUS CINCINATUS (Brandt).
52. PHALACROCORAX DILOPHUS ALBOCILIATUS Ridgw.
53. PHALACROCORAX PENICILLATUS (Brandt).
*54. PHALACROCORAX PELAGICUS ROBUSTUS Ridgw. (Sutter County. Belding.)
55. PHALACROCORAX PELAGICUS RESPLENDENS (Aud.)

56. PELECANUS ERYTHRORHYNCHOS Gmel.
57. PELECANUS CALIFORNICUS Ridgw.
*58. FREGATA AQUILA (Linn.)
*59. MERGANSER AMERICANUS (Cass.)
60. MERGANSER SERRATOR (Linn.)
61. LOPHODYTES CUCULLATUS (Linn.)
62. ANAS BOSCHAS Linn.
63. ANAS STREPERA Linn.
*64. ANAS PENELOPE Linn. (Forest and Stream, xxvi, 426. Auk, iii, 4, 490.)
65. ANAS AMERICANA Gmel.
66. ANAS CAROLINENSIS Gmel.
*67. ANAS DISCORS Linn. Only five specimens are known to have been taken in California. Zoe, ii, 2, 97 and 128.
68. ANAS CYANOPTERA Vieill.
69. SPATULA CLYPEATA (Linn.)
70. DAFILA ACUTA (Linn.)
71. AIX SPONSA (Linn.)
72. AYTHYA AMERICANA (Eyt.)
73. AYTHYA VALLISNERIA (Wils.)
74. AYTHYA MARILA NEARCTICA Stejn.
75. AYTHYA AFFINIS (Eyt.)
76. AYTHYA COLLARIS (Donov.)
77. GLAUCIONETTA CLANGULA AMERICANA (Bonap.)
78. GLAUCIONETTA ISLANDICA (Gmel.)
79. CHARITONETTA ALBEOLA (Linn.)
*80. CLANGULA HYEMALIS (Linn.)
*81. HISTRIONICUS HISTRIONICUS (Linn.)
*82. SOMATERIA SPECTABILIS (Linn.)
83. OIDEMIA AMERICANA Sw. & Rich.
84. OIDEMIA DEGLANDI Bonap.
85. OIDEMIA PERSPICILLATA (Linn.)
86. ERISMATURA RUBIDA (Wils.)
87. CHEN HYPERBOREA (Pall.)
*88. CHEN ROSSII (Baird).
89. CHEN CÆRULESCENS (Linn.)
90. ANSER ALBIFRONS GAMBELI (Hartl.)
91. BRANTA CANADENSIS HUTCHINSII (Sw. & Rich.)
92. BRANTA CANADENSIS OCCIDENTALIS (Baird).

93. BRANTA CANADENSIS MINIMA Ridgw.
94. BRANTA NIGRICANS (Lawr.)
*95. PHILACTE CANAGICA (Sevast.) (Townsend, Auk, iii, 4, 490.)
96. DENDROCYGNA FULVA (Gmel.)
97. OLOR COLUMBIANUS (Ord).
*98. OLOR BUCCINATOR (Rich.)
99. PLEGADIS GUARAUNA (Linn.)
*100. TANTALUS LOCULATOR Linn.
101. BOTAURUS LENTIGINOSUS (Montag.)
*102. BOTAURUS EXILIS (Gmel.)
103. ARDEA HERODIAS Linn.
104. ARDEA EGRETTA Gmel.
105. ARDEA CANDIDISSIMA Gmel.
106. ARDEA VIRESCENS FRAZARI Brewst.
107. NYCTICORAX NYCTICORAX NÆVIUS (Bodd.)
108. GRUS MEXICANA (Müll.)
109. RALLUS OBSOLETUS Ridgw.
110. RALLUS VIRGINIANUS Linn.
111. PORZANA CAROLINA (Linn.)
*112. PORZANA NOVEBORACENSIS (Gmel.)
*113. PORZANA JAMAICENSIS (Gmel.)
*114. PORZANA JAMAICENSIS COTURNICULUS Baird. Extremely doubtful if ever found on Farallon Is., or in California. (Cf. Ridgway, Proc. U. S. Nat. Mus. xiii, No. 828, pp. 309–311.)
*115. GALLINULA GALEATA (Licht.)
116. FULICA AMERICANA Gmel.
117. CRYMOPHILUS FULICARIUS (Linn.)
118. PHALAROPUS LOBATUS (Linn.)
119. PHALAROPUS TRICOLOR (Vieill.)
120. RECURVIROSTRA AMERICANA Gm.
121. HIMANTOPUS MEXICANUS (Müll.)
122. GALLINAGO DELICATA (Ord).
123. MACRORHAMPHUS SCOLOPACEUS (Say).
*124. TRINGA CANUTUS Linn. (Townsend, Proc. U. S. Nat. Mus., 1887, 198.)
*125. TRINGA MACULATA Vieill.
*126. TRINGA FUSICOLLIS Vieill. (Bryant, Auk, iv, 1, 78.)
127. TRINGA MINUTILLA Vieill.

128. TRINGA ALPINA PACIFICA (Coues).
129. EREUNETES OCCIDENTALIS Lawr.
130. CALIDRIS ARENARIA (Linn.)
131. LIMOSA FEDOA (Linn.)
132. TOTANUS MELANOLEUCUS (Gmel.)
*133. TOTANUS FLAVIPES (Gmel.)
*134. TOTANUS SOLITARIUS CINNAMOMEUS Brewst.
135. SYMPHEMIA SEMIPALMATA INORNATA Brewst.
136. HETERACTITIS INCANUS (Gmel.)
137. ACTITIS MACULARIA (Linn.)
138. NUMENIUS LONGIROSTRIS Wils.
139. NUMENIUS HUDSONICUS Lath.
140. CHARADRIUS SQUATAROLA (Linn.)
141. CHARADRIUS DOMINICUS Müll.
142. ÆGIALITIS VOCIFERA (Linn.)
143. ÆGIALITIS SEMIPALMATA Bonap.
144. ÆGIALITIS NIVOSA Cass.
145. ÆGIALITIS MONTANA (Towns.)
*146. APHRIZA VIRGATA (Gmel.)
147. ARENARIA INTERPRES (Linn.)
148. ARENARIA MELANOCEPHALA (Vig.)
149. HÆMATOPUS PALLIATUS Temm.
150. HÆMATOPUS BACHMANI Aud.

ADDITIONS TO THE BIRDS OF THE GRAY'S HARBOR REGION, WASHINGTON.

BY SAM HUBBARD, JR.

Having been a resident of Gray's Harbor, Washington, for two years, viz.: from August, 1889, to 1891, I am able from personal observation to add a few species to the number observed by Mr. R. H. Lawrence, as set forth in his very interesting article in the January *Auk*, entitled: "A Preliminary List of the Birds of the Gray's Harbor Region, Washington." There are doubtless many other species observed and noted at the time, that have been left out of my incomplete list.

Gray's Harbor is the estuary or enlarged mouth of the Chehalis River. It is in the shape of a pear: the stem being the Chehalis River and the seed end being the entrance into the ocean. Three

rivers flow in from the north, viz.: The Wishkah, Hoquiam and Humptulips, and two from the south: John's River and Elk River. The harbor is very shallow, and at low tide the mud flats extend over a mile from shore. There is also a large flat nearly ten miles long bare at low tide, between the north and south channels, locally known as the middle ground. This is composed of mud at the upper end and sand at the lower end, and affords much feed for countless numbers of shore and bay birds. I am satisfied that several species of sandpipers and waders can be found there not noted in either list.

During the winter time ducks are abundant and afford much sport. From January until April canvas backs are very plenty. They feed on young clams which they dive for when the tide is in. They decoy easily and large bags are made by the sportsmen, who hide in the roots of the big spruce snags, that have drifted out of the rivers, and lodged on the mud flats.

Many ocean birds are driven in by storms and seek refuge in the harbor. As some of these outside birds are not familiar to me I have doubtless passed over a few that can be found in Gray's Harbor at any time during the winter.

Land birds, in comparison with other places I have been, are scarce. Ruffed and dusky grouse are comparatively plentiful, and also the robin, varied thrush and rusty song sparrow.

I made two trips into the Olympic Mountains by the way of Quinault Lake. On the last trip I went to the summit of the divide on the extreme head waters of the east fork of the Quinault. Birds were very scarce; in fact in the dense, damp woods of that region, life of any kind is scarce. We would tramp for hours and not see a living, breathing thing; not an ant, a bee, or an insect of any kind; not a squirrel or a bird, nothing but a vast wilderness of trees. When we reached the summit we were above the timber line, and there we found an open country covered with a beautiful growth of fresh green grass. The scent of wild flowers was in the air, humming birds and honey bees were darting about here and there, beautiful little cascades and clear mountain lakes pleased the eye, and everywhere nature appeared in her wildest and loveliest form.

1. ——— *Colymbus* sp.? Common in winter.
2. Pacific Loon. *Urinator pacificus?* Abundant.
3. ——— *Sterna* sp.? Common in winter.

4. Black-footed Albatross. *Diomedia nigripes.* Rare, driven in by storms.

5. California Brown Pelican. *Pelecanus californicus.* Tolerably common.

6. Hooded Merganser. *Lophodytes cucullatus.* Tolerably common.

7. "Whale Bird." *Puffinus* sp.? An ocean bird occasionally driven in by storms. Thousands of these birds fly in a continuous line up and down the coast, about a mile out at sea.

8. Green-winged Teal. *Anas carolinensis.* Common in winter.

9. Cinnamon Teal. *Anas cyanoptera.* Common in winter.

10. Shoveller. *Spatula clypeata.* Tolerably common.

11. Pintail. *Dafila acuta.* Between Gray's Harbor and Shoalwater Bay is a stretch of low, swampy ground called Cranberry Bog. Some few mallards breed in there, and I think also an occasional sprig and teal.

12. Red-head. *Aythya americana.* Rare.

13. Old-squaw. *Clangula hyemalis.* Tolerably common in winter.

14. Surf Scoter. *Oidemia perspicillata.* Very abundant, particularly on ocean beach. Residents along the beach claim that when these birds get washed ashore it is impossible for them to get out to sea again, owing to the pounding of the surf on the beach. My own observation tends to confirm this report.

15. Lesser Snow Goose. *Chen hyperborea.* During migrations.

16. American White-fronted Goose. *Anser albifrons gambeli.* During migrations.

17. California Clapper Rail. *Rallus obsoletus.* Saw one individual.

18. Virginia Rail. *Rallus virginianus.* Rare.

19. American Coot. *Fulica americana.* Abundant.

20. Long-billed Dowitcher. *Macrorhamphus scolopaceus.* Tolerably common.

21. Sanderling. *Calidris arenaria.* Common in winter and late into spring on ocean beach; feed on sand fleas and arrive at the season when their food is plentiful.

22. Marbled Godwit. *Limosa fedoa.* Common.

23. Greater Yellow-legs. *Totanus melanoleucus.* Tolerably common.

24. Western Willett. *Symphemia semipalmata inornata.* Very common.

25. Killdeer. *Ægialitis vocifera.* Common.

26. Mourning Dove. *Zenaidura macroura.* Have seen a few: rare near Montesano.

27. Turkey Vulture. *Cathartes aura.* Tolerably common.

28. Marsh Hawk. *Circus hudsonius.* Abundant.

29. ——— *Accipiter* sp.? Either Cooper's or the sharp-shinned hawk is quite common.

30. Western Red-tail. *Buteo borealis calurus.* Tolerably common. Several seen near Montesano.

31. Duck Hawk. *Falco peregrinus anatum.* Rare. Saw one in winter on Damon's Point catch a buffle-head duck.

32. Short-eared Owl. *Asio accipitrinus.* Tolerably common on the marshes.

33. Kennicott's Screech Owl. *Megascops asio kennicottii.* Had one alive which I took to be this variety.

34. White-headed Woodpecker. *Xenopicus albolarvatus.* Rare.

35. Pileated Woodpecker. *Ceophlœus pileatus.* One or two seen an Hoquiam River in dense timber.

36. Lewis's Woodpecker. *Melanerpes torquatus.* Tolerably common.

37. Western Nighthawk. *Chordeiles virginianus henryi.* Common in Chehalis Valley.

38. Black Swift. *Cypseloides niger.* Saw one flying over Quinault Lake that I took to be this species.

39. Kingbird. *Tyrannus* sp.? Common in Chehalis Valley.

40. Black Phœbe. *Sayornis nigricans.* Common in Chehalis Valley.

41. Clarke's Nutcracker. *Picicorvus columbianus.* Saw one or two flocks of these birds in the dense woods between Hoquiam and Quinault Lake. They are about the only birds to be seen in the depths of the woods. They feed on fir tufts and cones. They are rather silent.

42. Western Meadow Lark. *Sturnella magna neglecta.* Tolerably common resident.

43. Western Lark Sparrow. *Chondestes grammacus strigatus.* Common in Chehalis Valley.

44. Oregon Towhee. *Pipilo maculatus oregonus.* Tolerably common, particularly in Chehalis Valley and near Montesano.

45. Purple Martin. *Progne subis.* Common in Chehalis Valley.

46. Cedar Waxwing. *Ampelis cedrorum.* Saw several flocks of from fifteen to twenty on the Hoquiam River.

47. Nuthatch. *Sitta* sp.? Quite a common bird in the woods.

48. Chickadee. *Parus* sp.? Tolerably common, in flocks at all seasons.

ON THE NATURAL HISTORY OF THE FARALLON ISLANDS.

GEOLOGY AND BOTANY BY J. W. BLANKINSHIP.
ZOOLOGY BY CHARLES A. KEELER.

Thirty miles west of the Golden Gate, in the Pacific, are the Farallon Islands, composed of three groups, called the North, Middle and South Farallones, and various rocks and shoals. They have a general northwest and southeast trend, parallel with the coast, and from Noonday Rock on the North to the South Farallones is a distance of about eleven miles. All except the extreme southern are mere points of rock in the ocean, the largest being only 160 yards in diameter.

The South Farallon is nearly a mile in length from east to west, and about half that distance in its greatest width. Its greatest elevation is 343 feet, and upon this peak the lighthouse is situated. The island is visited each week from May to July by the eggers, but at other times it has only occasional communication with the shore by means of tugs and the lighthouse tender. It is chiefly noted as the largest sea-bird rookery on the Coast. The following notes refer only to the South Farallon Island, and as the result of a two-days' collecting excursion, can hardly claim to be more than a very general survey.

NOTES ON THE GEOLOGY.

The islands appear to be the projections of a granite ridge, which is elevated about 500 feet above the ocean floor. The granite is coarsely crystalline, much fissured and easily decomposed, and is mainly similar to that of Point Reyes peninsula. Sugar Loaf Rock, the northernmost extremity of the island, is a conglomerate of huge rounded boulders, and a 600-foot section of a similar sandstone is exposed at Point Reyes Light, immediately succeeding the granite.

Around the entire island, at an altitude of 50 feet above the present sea-level, an old coast line may be clearly distinguished, marked by numerous water-worn caves exactly similar to those now being eroded by the waves, and by a wave-cut terrace on the south and east sides of the island, which slopes gently from the 50-foot line to the water's edge. It is on this terrace that the dwellings of the island are situated. Great Arch Rock was excavated at this level.

There also appears to have been a short halt between this and the present sea-level, for at several points shallow and more recent caves are seen 27 feet above the sea, and a dim second terrace is shown on the west near the landing.

On the west side of Shubrick Point, on the northeast coast of the island, the caves marking the three shore-lines are found in nearly vertical position. Measurements made here showed the highest to be excavated to a distance of 186 feet, the second to about 25, and the one at the present sea-level to about 100 feet. It is said that there has been a noticeable elevation of the island in the last thirty years.

This uplift of the island reveals another interesting fact: The great wave-cut terrace is on the south and east sides, and varies from 300 yards in width on the former to about 75 on the latter, while the north and west shores are steep and precipitous. Now, the conditions being the same, the greatest amount of wave erosion is on the side of the prevailing winds, but, as is well known, the prevailing winds off the California coast are from the north and northwest. The observations of the Signal Service at Cape Mendocino and Point Reyes Light show, for monthly prevalence of winds, that 84 per cent. are from the north and northwest; even in winter, 75 per cent. are from these directions.

On the south shore of the island, near the dwellings, there are

fissures partly filled with a granitic conglomerate. Whether these fissures are natural, or were worn by the water, I was unable to determine. I also saw fragments of jasper and other rocks besides granite scattered about among the debris.

Mr. J. de la C. Posada informs me that about Carmel Bay, near Monterey, there are sea terraces at levels corresponding closely with those of the Farallones, and that a higher terrace is faintly outlined about 80 feet above the sea. This I may have overlooked at the Farallones. He found a conglomerate resting unconformably upon the granite and formed of materials eroded from it. This conglomerate is inclined at an angle of about 45°. I thought I could distinguish a marked dip toward the north in the conglomerate of Sugar Loaf Rock, but I was unable to make a close examination, owing to its separation from the island by a narrow channel, and to the roughness of the sea. The sandstone at Point Reyes Light appears to dip toward the south.

BOTANY.

The season was too far advanced for a good collection. Many species were already dead, and only dry fragments could be obtained. It is probable that a collection in May would add several more species to the list. Most of the plants here enumerated were doubtless brought over with the hay and other supplies, while those not thus introduced are given as "native." Eight species were found only in a small garden plot, protected from the rabbits, and elsewhere would be speedily exterminated. A single fresh-water alga was seen but not collected. There are no trees or shrubs on the island.

The soil is composed of decomposed granite and guano. Springs are few and small. *Bæria maritima* and *Lepigonum macrotheeum* are the chief food of the rabbits; at this time of the year there was little except the latter to maintain them, and many were dying of starvation.

Only one plant—*Bæria maritima*—has been long enough isolated to show variation for which specific rank has been claimed, and it is seriously questioned whether it has departed far enough from *B. uliginosa* to be considered even a variety. This is the "Farallon Weed." It grows abundantly earlier in the season, and is said to reach a length of two to four feet. It furnishes excellent pasturage, and is highly esteemed as "greens" by the inhabitants.

PHANEROGAMS—

Introduced.

* *Stellaria media* L.
Cerastium viscosum L.
† *Malva parviflora* L.
* *Erodium cicutarium* L'Her.
† *Trifolium microcephalum* Pursh.
† *Trifolium bifidum* Gray var. *decipiens* Greene.
† *Melilotus Indica* Allioni.
* *Medicago denticulata* Willd.
* *Sonchus asper* L.
† *Anagallis arvensis* L.
† *Polygonum aviculare* L.
† *Chenopodium album* L.
* *Polypogon littoralis* Smith.
† *Avena fatua* L.
* *Poa annua* L.
* *Festuca Myurus* L.
* *Hordeum murinum* L.

Native.

Sagina occidentalis Wats.
Lepigonum macrothecum Pursh.
Lepigonum medium Fries.
Claytonia perfoliata Donn.
Tillæa minima Miers.
Erigeron glaucus Ker.
Psilocarphus tenellus Nutt.
Eritrichium californicum DC.
Phyllospadix Torreyi Wats.
Juncus bufonius L.

FERNS—

Aspidium munitum Kaulfuss. Only a single specimen collected.

MOSSES—

Funaria hygrometrica Sibth. Abundant.

* Well established. † In garden only.

LICHENS—

Determined by Mr. M. A. Howe, of the University of California.

Theloschistes lychneus (Nyl.) Tuck. var. *pygmaeus* Fr. On high rocks.

Theloschistes ——? Similar situations.

Buellia petraea (Flat., Koerb.) Tuck.? On rocks.

Placodium (not fruited). On rocks.

ALGÆ—

Determined by Dr. C. L. Anderson (Diatomaceæ omitted).

Bryopsis plumosa Lmx.

Codium tomentosum Slack.

Monostroma quarternarium Desm.

Ulva latissima L.

Enteromorpha compressa Le Jolis.

E. clathrata Ag.

Cladophora scopæfornis Rupr.

C. uncialis Fl. Dan.

C. cartilaginea Rupr.

C. glomerata Ag.

Desmarestia ligulata Lmx.

Leathesia tuberiformis Gray.

Chordaria abietina Rupr.

Asperococcus sinuosus Bory.

Egregia Menziesii (Ag.) Aresch.

Laminaria Andersonii Farlow.

Alaria fistulosa Post. & Rupr.

Ptergophora Californica Rupr.

Macrocystis pyrifera Ag.

Nereocystis Lutkenana Rupr.

Fucus vesiculosus L.

F. fastigiatus Ag.

Halidrys osmundacea Harv.

Porphyra laciniata=P. vulgaris Ag.

PORPHYRA NAIADUM Anderson, n. sp.—Fronds small, seldom more than 2 inches long and ½ inch wide, very thin, spatulate with short stipes, tapering quickly into a flat membrane, with slightly wavy entire margin; dark purple or maroon; cells small, structure fragile and rapidly decaying.

This little Porphyra I have found growing only on Zostera and Phyllospadix, but it probably grows on other plants, hence the name for the order to which these two plants belong, Naiadaceæ. Some small mollusks, in rasping for food on these plants, cause abrasions, in which the spores of this Porphyra find a place to adhere and grow, so that many of the stems and leaves of these Naiads are literally covered with the brownish-purple fronds. It may be found at all seasons, wherever these weeds grow, along the whole length of our California coast.

Heretofore it has been distributed as *Porphyra vulgaris*, but without much more reason than our early botanists had for placing all seaweed in the genus Fucus.

It adheres closely to paper, and retains its natural color pretty well when mounted.

P. NEREOCYSTIS Anderson, n. sp.*—Fronds 3 to 20 inches long and 1 to 3 inches broad, very thin and ribbon-like, with nearly even or slightly crinkled edges and a somewhat pointed or oval tip; stipes very short or entirely wanting; frond often divided, sending long sections from either side; color brownish-purple, often changing to a bright carmine-purple, with a soft, glossy surface. Cells smaller, but otherwise hardly different from *P. vulgaris* Harv.

This large and beautiful Porphyra is most frequently found, on this Coast, growing on the long stems of the Nereocystis, although not always confined to that plant. Frequently it is torn loose and comes ashore in the drift, but mostly in fragments. It also has been considered only a form of *P. vulgaris*. But its structure, color and form surely entitle it to a specific place.

It adheres well to paper, and is seldom found until past midsummer, when the long stems of Nereocystis are well grown.

Ceramium diaphanum Roth.
Centroceras clavulatum Ag.
Microcladia Coulteri Harv.
M. borealis Rupr.
Ptilota asplenoides Ag.
P. plumosa Ag.=*P. filicina.*
P. densa Ag.

* This was published — name only — in "List of California Marine Algæ," Zoe. ii, 221.

Pikea Californica Harv.
Grateloupia Cutleriæ Ktz.
Farlowia compressa J. Ag.
Prionitis lanceolata Harv. Several forms.
P. Andersonii Eaton.
Gigartina radula Ag.
G. horrida Farl.
G. papillata Ag.
G. canaliculata Harv.
Endocladia muricata Ag.
Iridea laminarioides Bory.
Callophyllis variegata Ktz.
C. laciniata Ktz.
C. furcata Farl.
Gymnogongrus linearis Ag.
Rhodymenia palmata Grev.
Cordylecladia conferta Ag.
Plocamium coccineum Lyngb.
P. violaceum Farl.
Nitophyllum multilobum J. Ag.
N. Fryeanum Harv.
N. latissimum Ag.
N. Ruprechtianum Ag.
N. violaceum J. Ag.
N. Andersonii Ag.
Gelidium corneum Lmx.
G. cartilagineum Grev.
Rhodomela floccosa Ag.
Polysiphonia Baileyi Ag.
P. Woodii Harv.
P. parasitica var. *dendroides* Ag.
Laurencia pinnatifida Lmx.
Chylocladia ovalis Hook. var. *Coulteri* Harv.
Corallina officinalis L.
C. squamata Ellis & Sol.
Amphiroa Orbigniana Harv.
Melobesia amplexifrons Harv.

ZOOLOGY.

The birds of the Farallon Islands have been collected and recorded until they are tolerably well known; but, so far as I am aware, no attempt has hitherto been made to collect representatives of all the forms of life resident upon this little group of rocks. The trip made by Mr. J. W. Blankinship and myself, on July 3, 1892, was limited by the necessities of the case to a stay of only two whole days upon South Farallon Island, but we availed ourselves of the opportunity to collect in all departments of natural history to the fullest extent possible. In so brief a stay it was manifestly impossible to do more than skim over the surface in most branches, but the lists, even in their incomplete form, may be of value in showing the character of the life of the spot. Larger collections might have been made of certain classes had not Mr. Blankinship devoted a large part of his time to the study of the geology and botany of the island, while I was engaged in observing the habits of the birds and in making collections of the young for future investigation.

The results of the survey were disappointing in one respect, viz.: that no evidence was obtained indicating that any of the animals of the islands have become differentiated from mainland forms. It may be that fuller collections, or more careful elaboration of the material obtained, would show some slight variations, although, if present at all, they are undoubtedly very incipient in nature. It would seem as if the wingless beetles and the one batrachian of the islands would be effectually isolated upon a bare rock thirty miles from the mainland, but it is impossible to say that these forms have not been accidentally introduced in recent times through the agency of man. Unfortunately, we have been unable to have some few of the spiders, insects, etc., identified, so these forms are necessarily omitted from the list.

Mr. Wm. E. Ritter named the two following radiates:

Asterias ochracea.

Strongylocentrotus purpuratus.

MOLLUSCA.

The following list of the mollusca thus far recorded from the Farallones has been kindly compiled by Dr. J. G. Cooper, from his published and unpublished lists, together with the collection of the expedition:

Martesia intercalata Cpr. (in Haliotis shells).
Entodesma saxicola, Baird.
Psephis tellimyalis Carp.
Rupellaria lamellifera Conr.
Chama pellucida Sby.
Mytilus californianus Conr. Abundant.
Septifer bifurcatus Reeve.
Modiola modiolus Linn.
Axinæa subobsoleta Carp.
Hinnites giganteus Gray. Edible.
Placunanomia macroschisma Desh.
Tornatella punctocælata Carp.
Cryptochiton stelleri, Midd.
Mopalia ciliata Gould.
vespertina Gould.
Nuttalina scabra Reeve.
Ischnochiton magdalensis Hinds.
Leptochiton internexus Carp.
Acmæa testudinalis Müll. var. *patina* Midd.
pelta Esch. Abundant.
var. *asmi* Midd.
var. *pintadina* Gould.
persona Esch.
scabra Nutt. Rare.
spectrum Nutt. One of the most abundant species living about the rocks.
mitra Esch.
Lottia gigantea Gray. Tolerably common.
Lepeta cæcoides Carp.
Gadinia reticulata Sby.
Fissurella volcano Reeve.
Glyphis aspera Esch.
Clypidella bimaculata Dall.
Haliotis cracherodii Leach.
rufescens Swains.
kamschatkana.
assimilis Dall.
Phasianella compta Gld. var. *pulloides* Carp.
Leptothyra carpenteriana Pilsbry.

Chlorostoma funebrale A. Ad. Very abundant.
brunneum Phil.
montereyi Kiener.
Calliostoma costatum Mart. Abundant.
Margarita pupilla Gould.
lirulata Carp.
Crepidula adunca Sby. Common.
navicelloides Nutt.
Hipponyx antiquatus Linn.
Bittium filosum Gld.
armillatum Carp.
Littorina planaxis Nutt. The commonest shell of the islands.
scutulata Gld. Much less common than the preceding, although found together.
Lacuna solidula Louen.
unifasciata Carp.
Barleeia haliotiphila Cpr.
Trivia californica Gray.
Erato vitellina Hinds.
Conus californicus Hinds.
Odostomia inflata Carp.
Cerithiopsis tuberculata Mont.
Mitra maura Swains.
Amphissa corrugata Rve.
Purpura crispata Chem.
canaliculata Duclos.
Ocinebra lurida Midd.
interfossa Carp.
Cerostoma foliatum Gmelin.
Pedicularia californica Newc.
Fusus luteopictus Dall.

Mr. Chas. Fuchs has kindly identified the Coleoptera as follows:
Amara californica Dej.
aurata Dej.
Bradycellus californicus Lec.
Blechrus nigrinus Mann.
Tachycellus nitidus Dej.
Axinopalpus biplagiatus Dej.
Necrophorus nigritus Mann.

Hister Lecontei Mars.
Saprinus lugens Er.
Coniontis Eschscholtzii Mann.
Eleodes consobrina Lec.

I am indebted to the courtesy of Mr. Jas. E. Benedict, of the National Museum, for the identification of the following Crustacea:

Heterograpsus nudus Dana.
Pachygrapsus crassipes Randall.
Eupagurus hirsutiusculus Dana.
Ligia occidentalis Dana.
Idotea ? hirtipes Dana.
Pollicipes polymerus Sowerby.
Tetraclita porosa, var. Gmelin.

The only batrachian of the islands has been previously recorded by Cope:

Autodax lugubris.

BIRDS.

Leaving the fisherman's wharf in San Francisco in the little one-masted boat of the Greek eggers early Sunday morning, July 3, we expected to arrive at the island early in the afternoon; but the fates decreed otherwise. We set sail with a high head-wind, and for a time birds were not to be thought of as we lay below deck in darkness, with an environment of choice odors evidently made on purpose to delight the heart (and stomach) of the novice at seamanship —a bloody liver dangling at our feet and pans of stale meat at our heads. This soon grew intolerable, and we insisted upon having the after hatch opened. Standing up and breathing the fresh sea air was better than being cooped up below, although the bucketfulls of water which were hurled into our faces every few minutes by those conspirators against our peace of mind, the wind and wave, might have been thought disagreeable by the over-fastidious. The fortunate possession of a rubber coat saved me from being completely drenched, and with the exception of the seepage from an occasional injudicious shower of spray running down my neck, and a pair of wet shoes, I kept tolerably dry. The case was otherwise with my companion, however: he had no rubber coat, and was accordingly soon compelled to go below, drenched and disconsolate.

The only bird noted in the bay and about the Golden Gate was

the California guillemot, which was fairly common. It would seem from an examination of the dead bird as if the guillemot must be a slow and clumsy flier, so small are the wings in proportion to the size of the body; but, when once started in the air, they fly with great swiftness, their sharply-pointed bodies cleaving the air like a spear, and their compact little wings whirring at a great rate. They were very tame, and allowed the boat to draw quite close before making any attempt to escape. Some would then dive with an impatient jerk, but the majority would start to fly. Apparently not having the time nor energy to lift their bodies out of the water, they would flap along on the surface, splashing and scuffling in a ludicrously frantic manner. Occasionally some peculiarly energetic individual would actually lift himself above the sustaining fluid and essay to fly, but, apparently blinded in his hurry to escape, would plunge directly at the first wave that happened to be slightly higher than usual, and literally fall all over himself in the most awkward manner imaginable. I noticed that whenever the bird dived the wings were thrown out, as if to assist in swimming, instead of being folded close to the body, as with most diving birds. Later observation confirmed the theory that the birds swim under water with their wings more than with their legs, for they may frequently be seen under water from the Farallon rocks using the wings in this manner. Indeed, the form of the wing is curiously analogous to the wing of a penguin, being shaped something like a flipper, and very stiff and compact. It is, of course, only an analogy, the penguin's wing being scaled, while the character of the guillemot's wing is due to the feathers. It seems not improbable, however, that the guillemot is gradually losing the power of flight, just as the great auk lost it, in order to gain greater freedom in swimming under water. Its difficulty in rising from the water and awkwardness in falling back into it would seem to argue in favor of this view, in spite of its swift flight in a gale of wind.

In all this digression it must not be forgotten that the wind is still blowing and our little craft tumbling about as it approaches the bar in Golden Gate. An occasional Brandt's cormorant would flap past, its long neck stretched far ahead of the clumsy black body, as if trying its best to part company with so slow a companion. As we get a little way out to sea, a large rock, slightly isolated from the mainland, is noticed completely whitened with the guano of this

species, indicating the presence of a large rookery. The wind, which had been uncomfortably brisk inside the bay, left us almost entirely after we were well out to sea, and we were soon rolling aimlessly about on the broad ocean swells, with only an occasional puff of wind to make the sails flap. Thus we spent the rest of the day. The night was varied by a dense fog closing in around us, and the cheerful tones of an old tin fog-horn, with responses from two or three neighboring vessels, lent a little life to the scene for a time. Not appreciating the bits of greasy fried liver upon which our captain and crew of two made their morning, noon and evening meal, bread and claret completing the bill of fare, we went supperless to bed. On looking out early the next morning the dark, lead-colored water and foggy air looked cheerless enough, but we were consoled by the information that we were sailing under a good breeze directly towards our destination. Soon the North Farallones loomed up through the fog—little bare rocks, with the waves dashing against their sides. Presently midway rock was passed, and at last we were in sight of South Farallon. Almost before we know it the sail has been lowered, and we row past Sugar Loaf Rock into Fisherman's Bay, where the anchor is lowered and the fog-horn blown to summon the eggers on shore to send a skiff for us to land. As we lay at anchor in the little cove the sight was, indeed, a novel one. The rocks were of a light pinkish or cream color from the guano upon them, interspersed with patches of pale-green where some moss or lichen had taken root, apparently. Lower down, where the waves dash upon them, they were clean and almost black in color, while in beautiful contrast to their sombre hue the breakers were dashed into white foam and pale-green opaline tints. But the thing which interested us the most was the vast assemblage of birds. Every cranny upon the face of the rough granitic cliffs was alive with guillemots, uttering their characteristic note, some at rest, some fluttering and scrambling or bobbing their heads; the whole scene being one of indescribably weird animation, and unlike anything else imaginable, unless it be the witches in Faust on Walpurgis night. Here and there the black figure of a cormorant upon her nest was noticed, or one would fly by with a fish in her bill, headed toward her nest. An occasional puffin (*Lunda cirrhata*), or sea parrot, as it is aptly called, would fly past the boat, with its immense odd bill of red and the big patch of white on the head in striking

contrast to the dark color of the body. By far the most familiar birds were the western gulls *(Larus occidentalis)*. They flocked about the boat in considerable numbers, displaying their beautiful dark slate-blue mantle and yellow bills with the scarlet patch near the tip. They were attracted by the refuse from the men's breakfast, which was thrown overboard in the cove. In spite of their fine plumage and graceful actions, they proved to be a disagreeable, noisy, quarrelsome bird.

After a half-hour of impatient waiting a skiff was lowered into the water from the sling in which it hangs from the rocks, and a man came out to land us, bags and baggage. Not until we were in the skiff bound for shore, and in the comparatively quiet waters of the cove, did I realize to its fullest extent the pleasures of a sea voyage by getting seasick; and then to lie down and watch my companion consume a good breakfast after a fast of thirty-six hours, and be able to join him only in spirit!

However, there was no time for lamenting the inevitable. Shortly after we had become established in our quarters at the residence of the head light-keeper, the eggers started to gather the eggs on the portion of the island known as West End, and we learned that it would be our only opportunity to visit that district, as the eggers object to disturbing the birds except just after they have plundered them.

The eggers had refused to allow us to take a gun to the islands, but we found two young men there from San Francisco, who had come on the tug, and were provided with that implement so necessary to the bird collector. One of them, Mr. H. M. Anthony, very kindly went with me and assisted in securing such birds as I desired.

As we started off, following the course of the eggers, the gulls were by far the most conspicuous and noisy birds seen. Their most common note may be expressed by the syllables *quock kuck kuck kuck*, uttered very rapidly in a low, guttural tone. Sometimes it was varied thus—*kuck kuck kuck ka*—the quality of tone being the same as in the first instance. Frequently a higher cry would be heard, which may be indicated by the letters *ki aa*, with a strong accent on the first syllable. Again, one would utter a rattling, guttural cry, which sounded like a man being throttled. The young were quite common about the rocks, white in color, everywhere spotted with dark dusky. At the approach of an enemy they would

run and attempt to squeeze into any little cranny in the rocks they happened to espy, but were very readily caught by hand. The nest is a simple affair composed of dry weeds, mostly *Bæria maritima*, and placed almost anywhere upon a rocky hillside. No nests were observed on the steep cliffs overhanging the sea, the favorite situation being a hillside of moderate slope. The eggs are remarkably well protected in color, and the nest itself is so trifling an affair that it may frequently be almost stepped upon without being discovered, unless the attention is especially directed towards finding it. The birds are extremely noisy and vociferous as long as an intruder remains in their territory, hovering over him in large numbers and swooping upon him with menacing cries and gestures. Altogether, one feels more comfortable when he gets off their preserves. But the birds are remarkably inconsistent, for they are inveterate plunderers themselves. As the eggers go about the rocks, starting all the birds from their nests, the gulls follow closely in their train, breaking every cormorant's egg which comes in their way and devouring the contents. They even manage to crack the tough shell of the guillemot's egg if any should be passed by the eggers.

Continuing our scramble up the rocks, we presently reached the summit of the west end, where a wonderfully grand spectacle was unfolded to view. We found ourselves on the very edge of a precipice with a sheer drop of several hundred feet, perhaps, to the sea, which was breaking on the rocks below. All about the rocky ledges were rows of guillemots, frequently huddled together in enormous numbers. I sat down and made rough sketches of the birds, illustrating some of the attitudes they assumed. While observing them, one which sat upon the topmost ridge stretched its neck out and, leaning over, looked down at the sea as if contemplating a plunge. Others were busy dressing their plumage, while now and then one would rise up and flap its wings and then settle down again. A group of the birds drawn from life is represented in Plate xviii. So large a concourse of these birds is a strange sight indeed, and one furnishing much food for reflection. Here we see the social instinct in one of its most primitive forms. A community of ants or bees is far in advance of an assemblage of sea birds. Here they live, each pair with a piece of property and home of their own, a little nook of rock with a single egg upon it; and the own-

ers have well-defined ideas of individual rights and the impropriety of "jumping claims." Mr. Walter E. Bryant, in his Birds and Eggs from the Farallon Islands,* suggests that the curiously pronounced pear shape of the guillemot's egg is "an all-wise provision * * * preventing it from rolling off of a slightly inclined plane"—by which he means, I suppose, that it has been brought about by natural selection. This is a very interesting observation regarding the significance of the shape of the egg, and certainly seems to be perfectly plausible. The color of the guillemot's egg is no less remarkable than the shape. No two individuals lay eggs exactly alike; in fact, there is probably no bird which displays so great a diversity with respect to color and markings as the guillemot. Still more interesting: one of the eggers, a man of intelligence and veracity, apparently, informed me that the same pair of birds always laid the same style of an egg. He said that on particular isolated ledges where only a single pair built he would invariably find one form of marking upon the egg. Thus, on taking the egg from some known spot on alternate days, he would observe it was invariably scrawled, or from some other nook constantly unmarked white, while a third cranny would yield an egg spotted in a particular way. If this observation be true it is of considerable interest, and may perhaps furnish a clue to the reason for the diversity of type in the eggs. With most birds the color of the egg varies but little from the type of the species, and we may accordingly infer that the particular color is of some use, and is preserved by natural selection. The form of the egg is frequently more variable than the color, but with the guillemot the reverse is the case. The shape is remarkably constant, and there seems to be a good reason why it should be so. But there appears to be an equally good reason why the color should be variable. In nesting in great numbers close together there might frequently be difficulty in keeping each pair's property distinct if all the eggs were alike, but this difficulty would be entirely obviated if each pair laid a different style of egg. Natural selection, then, would not tend to preserve any one type of marking, but would rather encourage as great diversity as possible. If a pair does always lay the same style of egg the birds would learn their own kind once for all. This would be especially useful if the

* Proc. Cal. Acad. Sci. 2d Ser. Vol. I, p. 35.

same pair mated year after year. The observation upon the constancy of the color of eggs of a single pair would need confirming by competent scientific authority, however, before it could be entirely credited.

As I sat sketching the guillemots on the crest of the rock, their curious habit of bowing was repeatedly noticed. The first one in a row will deliberately bow his head, perhaps once, or sometimes two or three times, followed in turn by each one in the assembly. What the purpose of this curious maneuver is I was utterly unable to make out. The explanation that naturally suggests itself is that it is in some way connected with the courting of the birds, although there was really nothing to confirm this view.

Brandt's cormorant was also very abundant upon this West End ledge, and nested there in large numbers. Between the eggers and the gulls the birds of this section have a hard time of it, however, and no young of either the guillemots or Brandt's cormorant were discovered. After securing specimens of the adult of these species, together with a stray puffin, we started on our return course, visiting the rookery of Farallon cormorants on the way. Drawings were made of the old birds in various attitudes, and of the young in the nest. Plate xix shows a group of the young, with adult in the distance. The young are about as ugly specimens as nature ever permits, the comparison to a black greasy kid glove being especially apt in describing them. They are almost destitute of feathers, a little dark fuzz here and there indicating where they will eventually appear, while the pin-feathers may have started as dark-colored quills. On approaching a nest of young they would open their immense mouths and stretch their necks angrily towards the intruder, uttering a low, hoarse, plaintive *kwa kwa kwa kwa kwa*. On drawing nearer the cries are louder and very violent, the birds squawking loudly. One nest that I observed particularly, contained two young, one much larger than the other. As we sat watching them at a short distance the older bird was noticed preening and caressing the younger with its bill—a notable example of brotherly or sisterly affection. When the younger bird was removed and transferred to the collecting basket, however, the older one, instead of manifesting a decent amount of grief over the loss of its companion, commenced preening and dressing its own greasy skin in the most unconcerned manner imaginable the moment its own safety

was no longer menaced. Mr. Anthony called my attention to the fact that the nests of Brandt's cormorant were decorated around the sides with fresh seaweed, while the Farallon and Baird's cormorant built their nests exclusively of dried weeds, principally *Bœria maritima.*

We also visited the nesting place of Baird's cormorant, and obtained specimens of the old and young. This bird is less common than the other two cormorants and less communistic in its habits. It appears to resort to steep cliffs upon which to build its nest, while the other two species build upon a sloping hillside, as a rule. One solitary Baird's cormorant was noticed sitting upon her nest on a little shelf of rock only about fifty feet above the booming surf, and completely isolated not only from other individuals of her own species but from all the other birds of the island. A lonely life indeed amid the wild desolation of nature. Figures 1 and 2 of Plate xxi indicate the differences in the bill of the Farallon and Baird's cormorant. The former has a considerably longer bill, and there is quite a well marked difference in shape, even at this early age. The color of the skin is also quite distinct in the two species, being almost black or dark slate colored in the Farallon, and a seal brown in Baird's.

The return from the morning's collecting trip was made under difficulties for we had so many birds to carry that we could barely walk under the weight of some twelve cormorants, together with a few guillemots, puffins and auklets. The afternoon of the "glorious Fourth" was consumed in making rough skeletons of some of the birds, and putting others away in alcohol, while the evening was devoted to writing up the notebook. The following morning was largely taken up with collecting the shells and other marine life among the rocks, together with some insects, but I also managed to visit the nesting place of the puffins *(Lunda cirrhata)*, and Cassin's auklet *(Ptychoramphus aleuticus)*. The steep rocky hillside in which they nested was composed of a sort of coarse shale-like granite in which there were many fissures offering a safe retreat for the birds. Peering into some dark cranny a puffin would be barely visible at the further end. I was immediately struck with the use of the conspicuous white patch upon the face as a socialistic recognition mark. Were it not for this the bird would be completely invisible from the entrance to the burrow, and it would doubtless be a matter of con-

siderable convenience in the social intercourse of the parent birds. It is a significant fact that the patch is white, as with the markings about the head in so many mammals that live in burrows. There is, however, another use in this white patch of the sea parrot. I noticed that the setting bird always faced the entrance to her retreat, exposing the white patch in full view. On seeing this special precautions were used in inserting the hand to prevent being bitten, for the bite of a puffin is a dangerous thing. It is quite evident that this white patch must serve as a warning for intruders to keep off, and is one of the few cases of warning colors among birds which have come to my notice.

A series of the young of Cassin's auklet was obtained, but the bird is nocturnal in habits so that very little was seen of the adult. Figure 3 of Plate xxi shows the young puffin's head, the bill, even at this early stage of development being greatly enlarged and transversely grooved. The bird is feathered when hatched, apparently, at least the youngest specimen obtained was completely so, and of a dark brown color. Figure 5 shows the head of Cassin's auklet. It may be recognized at the earliest age obtainable by the little upturned snub bill and the gray feet.

In size and general color the young of the pigeon guillemot is not unlike the young of Cassin's auklet, both being dark-brown in color; but the difference in the shape of the bill, as shown in Figure 4 of Plate xxi, is very marked, as is also the character of the feet. The throat of the guillemot is feathered, while in the auklet it is almost naked, and of a dark slaty color.

Mr. Anthony noticed Cassin's auklets nesting along the sides of one of the caves which he explored, which is quite an unusual habit with this species. I noticed that they also nest on level ground in crannies under loose rocks. At night, especially if the moon is up, the birds are very abundant and noisy. Their note resembles the creeking of a rusty gate, and may be represented by the syllables *creek a reek! creek a reek! creek a reek!* Another nocturnal bird is the ashy petrel (*Oceanodroma homochroa*). It is perhaps not so rare upon the island as it is difficult to find. Mr. Anthony obtained a large number of eggs and birds by systematically turning over rocks on a hillside where they were known to be found. The nest is frequently, though by no means invariably, indicated by the strong musky odor in its vicinity. The flight of the petrel was light, quick

and noiseless, reminding one somewhat of the flight of a bat. I did not hear any note uttered by the bird. The irrepressible gulls were also abroad at night and their note at that time sounded as a pensive wail indescribably weird and mournful as it mingled with the creeking of multitudes of auklets and the roar of the waves and wind whistling about the sharp points of rock.

There is but one other sea bird which nests about the islands of which no particular mention has been made—the pigeon guillemot *(Cepphus columba)*. It is very common, although never seen congregating in such immense numbers as the California. When sitting upon the rocks facing the observer it appears to be a very dark brown bird with conspicuous scarlet feet. This brilliant color is undoubtedly a recognition mark as is also the characteristic white patch on the wing which is conspicuous both when the bird is at rest and in flight. Plate xx represents a group of the birds, the attitudes having been taken from life. The most characteristic attitude of the bird is an erect posture, with the entire foot upon the ground. Frequently it will squat flat down among the rocks, however. They may frequently be seen with fishes in their bills, but I was unable to determine whether for their own use or to feed the young. When anyone approaches they sit with their long slender bills wide open and utter a high pensive long drawn out squeak—*peeeeeeeeie*. Young birds were obtained from crannies in the rock, in much the same sort of place as the auklets breed.

In the foregoing account of the water birds breeding upon the Farallons little or nothing has been said of the eggs both because they have all been described and because my own efforts were directed towards obtaining the young birds and such few eggs as were found well incubated.

Only two land birds nest upon the island, the raven *(Corvus corax sinuatus)*, which is very rare but undoubtedly breeds there, and the rock wren *(Salpinctes obsoletus)*, which is extremely abundant and nests all over, at least the lower parts of the island. The black turnstone *(Arenaria melanocephala)*, was fairly common along the beach. No evidence of their breeding was discovered but it is a little remarkable that they have been recorded by Mr. Emerson*

*Bryant l. c. p. 44.

in May, June, July and August, if they do not nest there. But one addition to the list of birds published in Mr. Bryant's catalogue was made, the Carolina rail *(Porzana carolina)*. A specimen was shot by Mr. W. A. Beeman, head light-keeper, in August, 1890, and is now in his possession mounted.

It will not be necessary to detain the reader with a narrative of the remainder of the trip, as nothing new in the way of birds was discovered. Early on the morning of July 6, we received news that the egg boat was ready to return, so after hastily packing we soon found ourselves pitching about in a rough sea, en route for San Francisco.

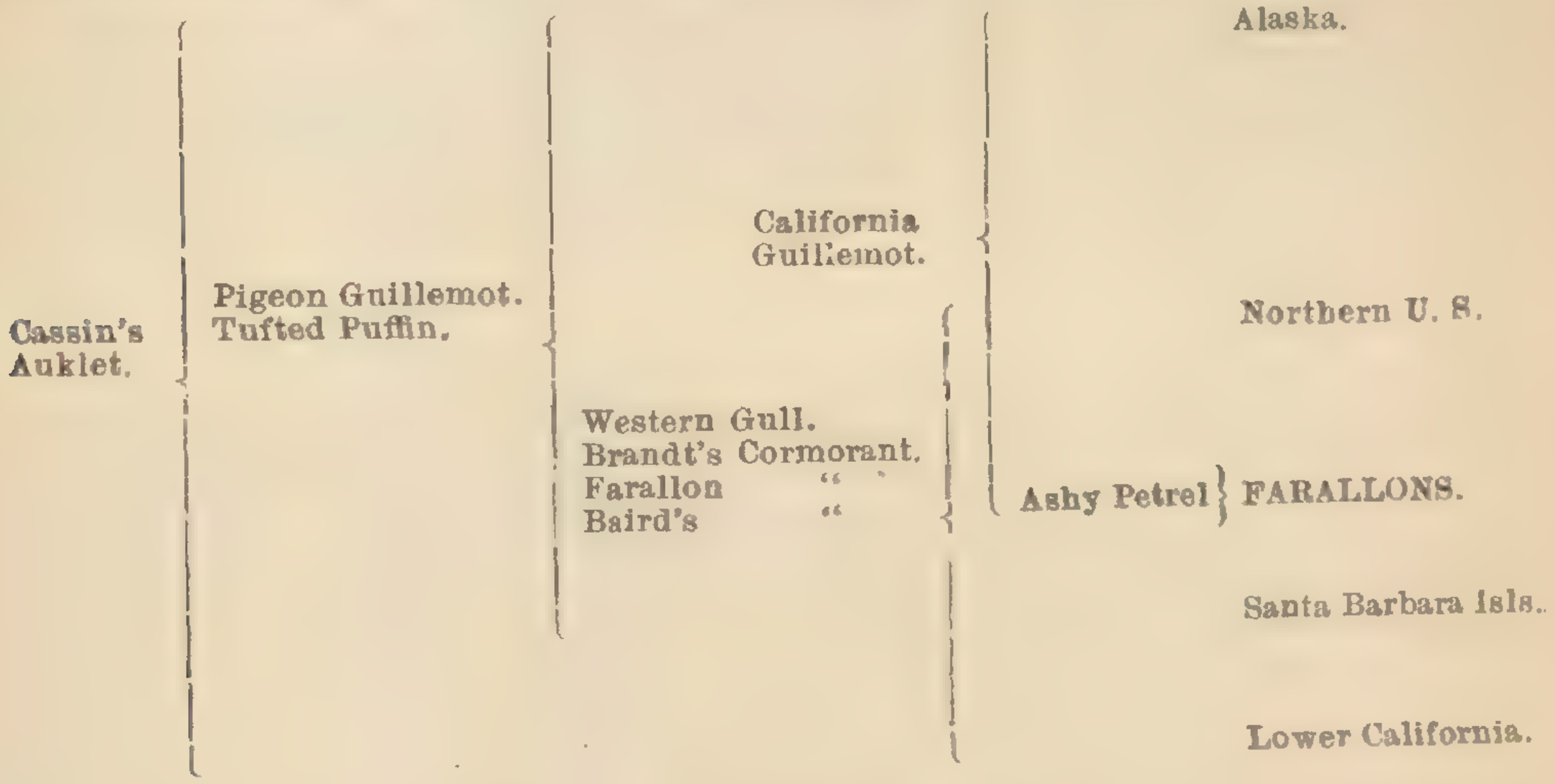
It may be fitting to close this account of the birds of the Farallones with a word on their geographical distribution in general. The water birds which nest upon these isolated rocks are such species as frequent the rocky islands and mainland of the north Pacific, as far north as Alaska. Indeed, the Farallones appear to mark the southern limit of breeding range of one or two species. Mr. Clark P. Streator* has noted the tufted puffin, Cassin's auklet, western gull, pigeon guillemot and the three cormorants of the Farallones breeding upon the Santa Barbara Islands. Of this number Mr. Bryant, in his Catalogue of the Birds of Lower California† records Cassin's auklet as breeding as far south as San Geronimo Island (Anthony), and the western gull as breeding on Todos Santos Islands off Ensenada and upon the Island of San Pedro Martir (Goss). The California guillemot I do not find recorded as breeding south of the Farallons. All three cormorants are found in Lower California and probably all breed from there north to Washington as stated in the A. O. U. Check List.‡ The ashy petrel has not been recorded, I believe, as breeding at any point except the Farallones. The com-

*O. & O. xiii, pp. 53–54.

†Proc. Cal. Acad. Sci. 2d Ser. vol. ii, pp. 250–251.

‡pp. 110–111.

parative distribution of the birds of the Farallones with regard to their breeding range may be graphically represented as follows:



MAMMALS.

As might be expected there are no land mammals native to the Farallones. Rabbits have been introduced and have multiplied until they are extremely abundant and very tame. They are of every imaginable shade of color from black, through brown and gray to white, sometimes clear, frequently mottled. During the dry season, the light-keeper informs me, they die off in great numbers owing to lack of food.

Sea Lions *(Eumetopias stelleri)*, are common, especially upon the North Farallones. Mr. Beeman informs me that fur seals *(Callorhinus ursinus)*, occasionally visit the islands during the winter months and also the leopard seal *(Phoca vitulina)*.

NOTE.—There are two more species which were overlooked and which should be added to the list of California water birds published in this issue.

NUMENIUS BOREALIS (Forst.) Recorded from San Diego by Mr. Holterhoff. (Auk, i, 4, 393.)

XEMA SABINII (Sab.) A specimen (No. 379) is in the collection of the California Academy of Sciences. It was taken on San Francisco Bay in October, 1889, and was identified by Mr. Belding.

W. E. B.

THE NOMENCLATURE OF PLANTS.

BY KATHARINE BRANDEGEE.

This subject is at present attracting a large amount of the attention of systematic botanists. An international botanical congress is to be held in Genoa next month, at which the questions will probably be freely discussed, although, from the known wide diversity of opinion, agreement is hardly to be hoped for. Of one thing we may be assured beforehand — the so-called "Kew rule," or rule of convenience, so tenaciously held in certain quarters, and reaffirmed in a posthumous letter by Dr. Watson, will have a numerically scant following. It is quite sufficient to imagine the ghastly state of affairs if Kuntze, in addition to his other liberties, had taken this and renamed the species according to fancy.

The following circulars, the first to botanists in general, the second to the botanists of America, have been sent out for the signatures of those who agree with them:

"PROPOSITIONS TO AN AMENDMENT OF THE 'LOIS DE NOMENCLATURE BOTANIQUE.'

Since the time of Linnaeus botanists have continually endeavored to gain a uniform nomenclature, and these endeavors were completely justified on account of an easier mutual understanding. We know very well that certain differences will always remain, because the decision on some questions only depends on the author's subjective opinion. But we hope that a gradual and continual reformation will bring an essential improvement. O. Kuntze's Revisio generum has raised an evident perturbation, and will cause a complete confusion; therefore, we thought it necessary to propose the following four resolutions, which refer only to the genera:

I. The starting point of the priority of the genera, as well as the species, is the year 1752, resp. 1753.

II. Nomina nuda and seminuda are to be rejected. Pictures alone, without diagnoses, do not claim any priority of a genus.

III. Similar names are to be conserved if they differ by ever so little in the last syllable; if they only differ in the mode of spelling, the newer one must fall.

IV. The names of the following larger or universally known genera are to be conserved, though after the strictest rules of pri-

ority they must be rejected; in many of them the change of the names now used is by no means sufficiently proved:

Ad 1. After Alph. de Candolle had proposed to take the year 1737 as the starting point of the priority of genera, many botanists had acknowledged it. But we think that the turning point from the ancient botany to our modern science rests in the introduction of the binominal nomenclature. Therefore, we propose, after a previous communication with Alph. de Candolle, to remove the starting point for both the species as well as the genera as far as to the year 1753, resp. 1752, date of the species plantarum ed. I. (1753), with the IV. ed. of the genera plantarum (1752). Before that time the scientific position of Linnaeus is not superior to Tournefort, Rivinus and many other botanists, who often had described and segregated the genera more exactly than he did.

Ad 2. Many genera have been founded on a picture only, without a diagnosis. No doubt by means of it a species sometimes can clearly be made out and recognized; and if the picture is a good one, all the characteristics of the plant can be observed. But a picture can never show the special characteristics alone which raise the genus above the other of its affinity. A genus only gains priority by a verbal diagnosis, and nomina nuda and seminuda are to be rejected; therefore, the following works cannot claim a right of priority: Rumphius, Herbarium Amboinense (1741–1755), Burmann, Flora Indica (1768), Patr. Browne, History of Jamaica (1756), Lamarck, Illustration des genres pro parte, etc.

Ad 3. There are to be conserved *Adenia* as well as *Adenium*, *Acnista* as well as *Acnistus*, *Alectra* as well as *Alectryon*, *Apios* as well as *Apium*, *Rubia* as well as *Rubus*, *Bellis* as well as *Bellium*, *Chloris* as well as *Chloraea* and *Chlora*, *Glyphaea* as well as *Glyphis* and *Glyphia*, *Calopogon* as well as *Calopogonium*, *Atropa* as well as *Atropis*, *Galax* as well as *Galaxia* and *Galactia*, *Danaë* as well as *Danais*, *Drimia* as well as *Drimys*, *Glechoma* as well as *Glechon*, *Hydrothrix* as well as *Hydrotriche*, *Micranthus* as well as *Micranthemon*, *Silvaea* as well as *Silvia*, etc.; we doubt that there is any scholar who will confound them. On the contrary, *Tetraclis* and *Tetracleis*, *Oxythece* and *Oxytheca*, *Epidendrum* and *Epidendron*, *Oxycoccus* and *Oxycoccos*, *Asterocarpus* and *Astrocarpus*, *Pellostema* and *Pellistema*, are only different modes of spelling the same word, and the newer one is to be refused if they name different genera.

Ad 4. The impulse that led to the acknowledgment of the right of priority was only the vivid desire to create a stable nomenclature. If we see that by the absolute and unlimited observance of the principle we probably gain the contrary of what we intended, we, who have ourselves made the rules of priority as a law, have the right to amend the latter. Therefore, we present a list of genera that have more than a merely scientific interest, or that are very large, and we propose to conserve them in spite of the rules of priority, in order to avoid a general confusion by the change of many thousand names.

The Committee—P. Ascherson, A. Engler, K. Schumann, I. Urban.

We agree to the four resolutions—A. H. Berkhout, R. Beyer, C. Bolle, R. Büttner, U. Dammer, B. Frank, A. Garcke, E. Gilg, M. Gürke, P. Hennings, O. Hoffman, L. Kny, E. Koehne, G. Krabbe, F. Kränzlin, L. Krug, M. Kuhn, G. Lindau, E. Loew, P. Magnus, F. Niedenzu, F. Pax, H. Potonié, O. Reinhardt, R. Ruthe, S. Schwendener, P. Taubert, G. Volkens, O. Warburg, A. Winkler, L. Wittmack, E. Wunschmann.

Num spec.	Nomina Conservanda.	Nomina Rejicienda.
5	Erophila DC. (1821)	Gansbium Ad. (1763)
50	Jonidium Vent. (1803)	Calceolaria Löffl. (1758)
4	Spergularia Pers. (1805)	Tissa v. Buda Ad. (1763)
40	Ternstroemia Thbg. (1794)	Mokofua Ad. (1763)
80	Malvastrum A. Gr. (1849)	Malveopsis Prsl. (1844)
11	Cola Schott et Endl. (1832)	Edwardia Raf. (1812)
17	Podalyria Lam. (1795)	Aphora Neck. (1790)
200	Oxytropis DC. 1802)	Spiesia Neck. (1790)
155	Desmodium Desv. (1813)	Meibomia Heist. ex Fabr. (1763)
80	Adesmia DC. (1825)	Patagonium Schrk. (1808)
55	Barringtonia Forst. (1775)	Huttum Ad. (1763)
70	Sonerila Roxb. (1820)	Cassebeeria Dennst. (1818)
30	Rhipsalis Pers. (1805)	Hariota Ad. (1763)
10	Paederia Linn. (1767)	Hondbesseion Ad. (1763)
16	Liatris Schreb. (1791)	Laciniaria Hill (1762)
140	Mikania W. (1803)	Willoughbya Neck. (1790)
115	Blumea DC. (1833)	Placus Lour. (1790)
28	Euryops Cass. (1818)	Jacobaeastrum Man. (1751)
24	Gazania Gärtn. (1791)	Meridiana Hill (1761)
160	Cirsium Scop. (1761)	Cnicus et Carduus L. 1753 ex. p.
80	Scaevola Linn. (1772)	Lobelia Ad. (1763)
50	Armeria Willd. (1807)	Statice Fabr. etc. (1759)
120	Statice Willd. (1807)	Limonium Fabr. etc. (1759)
3	Chonemorpha Don (1837)	Bellutakaka Ad. (1763)
50	Oxypetalum R. Br. (1809)	Gothofreda Vent. (1803)

Num. Spec.	Nomina Conservanda.	Nomina Rejicienda.
50	Herpestis Gärtn. (1805)	Brami Ad. (1763)
3	Tectona L. fil. (1781)	Theka Ad. (1763)
10	Aerva Forsk. (1775)	Uretia Ad. (1763)
45	Suaeda Forsk. (1775)	Dondia Ad. (1763)
90	Myristica L. f. (1781)	Comacum Ad. (1763)
30	Isopogon R. Br. (1810)	Atylus Sal. (1807)
14	Stenocarpus R. Br. (1810)	Cybele Sal. et Kn. (1809)
3	Telopea R. Br. (1810)	Hylogyne Sal. et Kn. (1809)
47	Dryandra R. Br. (1810)	Josephia Sal. et Kn. (1809)
24	Leucospermum R. Br. (1810)	Leucadendron Sal. et Kn. (1809)
60	Persoonia Sm. (1798)	Linkia Cav. (1797)
12	Nivenia R. Br. (1810)	Paranomus Sal. et Kn. (1809)
70	Leucadendron R. Br. (1840)	Protea Sal. et Kn. (1809)
3	Knightia R. Br. (1810)	Rymandra Sal. et Kn. (1809)
60	Protea R. Br. (1810)	Gagnedi Bruce (1790)
46	Banksia L. f. (1781)	Sirmüllera O. Ktze. (cf. ap. Pimeleam)
10	Sorocephalus R. Br. (1810)	Soranthe Sal. et Kn. (1809)
9	Lomatia R. Br. (1810)	Tricondylus Sal. et Kn. (1809)
76	Pimelea Gärtn. (1788)	Banksia Forst. (1776)
20	Struthiola L. f. (1767)	Belvala Ad. (1763)
12	Exocarpus Lab. (1798)	Xylophyllos L. (1771)
20	Julocroton Mart. (1837)	Cicca Ad. (1763)
175	Pilea Lindl. (1821)	Adicea Raf. (1815)
330	Dendrobium Sw. (1799)	Callista Lour. (1790)
30	Angraecum Lindl. (1826)	Angorchis Thou. (1809)
40	Polystachya Hook. (1824–25)	Dendrorchis Thou. (1809)
60	Eulophia R. Br. (1823)	Graphorchis Thou. (1809)
80	Spiranthes Rich. (1818)	Gyrostachys Pers. (1807)
400	Pleurothallis R. Br. (1813)	Humboldtia R. et P. (1794)
120	Liparis Rich. (1818)	Leptorchis Thou. (1809)
100	Bolbophyllum Spr. (1826)	Phyllorchis Thou. (1809)
85	Eria Lindl. (1825)	Pinalia Ham. (Febr. 1825)
60	Coelogyne Lindl. (1825)	Pleione Don (Febr. 1825)
8	Libertia Spr. (1825)	Tekel Ad. (1763)
19	Patersonia R. Br. (1807)	Genosiris Lab. (1804)
5	Hosta Tratt. (1812)	Saussurea Salisb. (1807)
59	Haworthia Duv. (1824)	Catevala Ad. (1763)
9	Astelia R. Br. (1810)	Funckia W. (1808)
36	Dracaena Jurs. (1767)	Draco Ad. (1763)
22	Thysanotus R. Br. (1810)	Chlamysporum Salisb. (1809)
3	Agapanthus l'Hérit. (1788)	Tulbaghia Heist. (1753)
30	Cyanotis Don (1825)	Tonningia Neck. (1790)
28	Dichorisandra Mik. (1820)	Stickmannia Neck. (1790)
40	Luzula DC. (1805)	Juncodes Ad. (1763)
60	Chamaedorea W. (1804)	Nunnezharia R. et P. (1794)
50	Pandanus L. f. (1781)	Keura Forsk. (1775)
20	Hydrosme Schott (1858)	Corynophallus Schott (1857)
215	Paepalanthus Mart. (1833–35)	Dupatya Vell. (1825)
200	Fimbristylis Vahl (1806)	Iria Rich. (1805)
33	Rottboellia L. f. (1781)	Manisuris L. (1771)
20	Setaria Beauv. (1812)	Chamaerhaphis R. Br. (1810)
3	Phyllocladus Rich. (1826)	Podocarpus Lab. (1806)
40	Podocarpus l'Hérit. (1810)	Nageia Gärtn. (1788)"

"In view of the International Botanical Congress to be held at Genoa, Italy, September 4th to 11th, 1892, we, the undersigned American botanists, favor the adoption of the following general principles of nomenclature:

I. The adoption of initial dates for generic and specific names.

II. That the publication of a generic name or a binominal specific name invalidates the use of the same name for any subsequently published genus or species.

III. That in the transfer of a species to a genus other than the one under which it was first published, the original specific name is to be preserved, unless such name has previously been employed in the genus to which the species is transferred; and if the author who transfers such species alters the name, it may be restored by any subsequent author.

IV. That a varietal name be treated as equal in rank to a specific name, in its relations as a homonym and in the transfer of species and varieties from one genus to another.

Frederick V. Coville,
B. T. Galloway,
J. M. Holzinger,
Walter H. Evans,
F. H. Knowlton,
Lester F. Ward,
George B. Sudworth,
N. L. Britton,
Thomas Morong,
William E. Wheelock,
Arthur Hollick,
Elizabeth G. Britton,
Anna Murray Vail,
Byron D. Halsted,
Thomas C. Porter,
John K. Small,
J. Bernard Brinton,
Timothy F. Allen,
H. H. Rusby."

To the first article in both propositions there is perhaps no serious objection—if the proposers can show that such alteration of the present rule offers any adequate compensation for the disturbance it will entail.

The second and third articles of the Berlin proposition merely formulate the existing practice of most naturalists, but many would like to amend by outlawing all such names as are founded on distributed sets, *i. e.*, dating them not from such distribution, but from the appearance of a diagnosis in print.

The fourth article would be an instance of special legislation, repugnant to the sense of justice of most botanists There are a great

many other genera in similar or even worse case, and why should these particular ones be singled out? And then, again, the name of P. Taubert signed to the articles can hardly fail to remind botanists of his recent resurrection of Aublet's generic names and inexcusable transference of all the species—of course attaching "Taub." to them; and to call attention to the fact that among the list to be conserved "in spite of the rules of priority, in order to avoid a general confusion by the change of many thousand names," those discredited by Taubert do not appear.

The second article of Dr. Britton's proposition is out of order until—at least—it shall have been adopted by zoologists in general and found to be useful in working. In botany such a rule—if made retroactive—would be of very small advantage and productive at the outset of almost infinite confusion. As a rule for present action there could be no possible exception, and a careful systematist will go farther and refrain from the giving of a generic name which has been used in zoology.

The third article is in accord with the principles and practice of most botanists, but the opponents though few are powerful. It has always seemed odd to me that if the principle of priority were admitted at all, there should ever be a question of the propriety of adhering to it in specific names, the species being the unit and generic, tribal, ordinal, etc., merely classifying names. The claim that "the oldest specific name under the proper genus" should be conserved, is little less than an absurdity—for who in these days shall say when the "proper genus" has been reached, and meantime in the irresponsible hands of Rafinesquians how many binomial synonyms may be inflicted upon us?

The fourth article is in my opinion illogical and inadmissible.

Some of the lighter and more diverting phases of our nomenclatural woes are dealt with by Prof. E. L. Greene who, in Pitt. No. 11, finds himself "minded" to take up the cudgels in behalf of Dr. Kuntze's "Revisio" and the first edition of the Systema as a starting point. In objecting to a review by Dr. Schumann he says: "Against the 1735 starting point Dr. Schumann assumes the singular and surely untenable position that the work as regards genera is a list of naked names without diagnoses." If Mr. Greene had ever seen a copy of the first edition of the Systema he would perhaps not have made the remark, which shows so well the danger of

dealing with matters not sufficiently understood. The classification of plants is in that work spread out in tabular form over two great folio pages; in these two pages there are under the mark "† Nova genera a me constituta" twenty-five genera without any mark or reference or means of diagnosis other than that afforded by "Tri-andra monogynia," etc., and ten times as many with no mark whatever beyond the bare word.

A second of his amusing "pronouncements" is the following: "*Watsonamra* has few if any chances of perpetuity, the genus of palms, *Serenoa*, apparently precluding it; for never yet has it been admitted that two generic names may stand in honor of the same man." We commend these remarks to our friends the mycologists in the light of, say "Saccardia," "Saccardinula," "Saccardoella," etc. Perhaps when Professor Greene and his vagaries have been forgotten some botanist, equally desirous of notoriety, may be enabled to coin a generic name or two by discovering that "Greenella" and "Greenina" are merely synonyms of "Chlora" and "Chloræa."

A NOTE ON NOMENCLATURE.*

BY ALPHONSE DECANDOLLE.

Many botanists are alarmed by the changes in the generic names of plants proposed by Kuntze. But the researches which have been made, and the opinions which are daily published on the subject of nomenclature, may, however, give some reassurance.

I have had the curiosity to ascertain what generic names Kuntze claims should be changed in the twenty-six families which I have been studying, either for the Prodromus or the first volume of our Monographiæ, and their number is twenty-eight. Now, after an attentive consideration of the reasons given by Kuntze, only six names are found which require to be changed by the application of the well-known law of priority, while twenty-two of the changes are inadmissible.

Dr. Briquet, who is better acquainted with the family of the Labiates than any other person, has found that of the fifteen changes proposed by Kuntze, only five are justifiable, while ten are not admissible.

* Translated for Zoe from Journal of Botany, May, 1892, by C. C. P.

After these two examinations, made conscientiously, *the number of the changes proposed by Kuntze must be reduced by two-thirds.*

While rendering, therefore, due justice to the learning and accuracy of this scientist, I am bound to say that there are several sources of error in his conclusions. I will call attention to the two most important ones:

(a) Kuntze takes for genera names only apparently generic, and which are not accompanied by characters sufficiently descriptive of them. A genus is only constituted by the union of a name and the distinctive characters of the plant. Without that it is a genus still-born. It is *nil*, and therefore can produce no result, especially in the application of the law of priority. All botanists are agreed about *nomina nuda* or *seminuda*.

(b) The starting point for the genera of Linnæus is certainly his *Genera* of 1737, and not his *Systema*, ed. 1, of 1735. This latter had only for its object to make known the twenty-four classes of the author. Some names of genera are indicated there, but without special characters, for the genus is not defined by the single notion conveyed by the term Hexandria or Pentandria digynia. It was in 1737 that Linnæus enumerated and characterized all the genera he was acquainted with, in his *Genera*, in which he abandoned the names of the *Systema*, regarding them, no doubt, as useless.

In my *Nouvelles Remarques sur la Nomenclature*, in 1883, I have explained why we should start from the *Genera* rather than from the *Systema*, and I have seen with pleasure this opinion recently sustained by Daydon Jackson (Bot. Journ. February, 1892); Botanical Gazette (March, 1892); and Schumann (Naturwiss, Rundschau, Jarhrgang 7, No. 13). The remarks of this latter scientist, favorable to our laws of nomenclature of 1867, have a value so much the greater because he says: *An understanding had been arrived at, before their publication, with the botanists of Berlin and some foreign botanists.*

The principles which I maintained in 1867 and in 1883 are thus supported by good judges, and I confess it is a great satisfaction to me in my old age.

RECENT LITERATURE.

Darwin and After Darwin. An Exposition of the Darwinian Theory and a Discussion of Post-Darwinian Questions. By GEORGE JOHN ROMANES, M. A., L. L. D., F.R.S. I. The Darwinian Theory.*

Ever since the publication of the Origin of Species by Means of Natural Selection, scientists have been at work adding testimony of the fact of evolution and discussing theories explanatory of the fact, until, at the present time, the literature of the subject has become highly complex and involved. It would be interesting, indeed, if the voice of Darwin could be heard to-day concerning the many questions which have arisen since his death, or upon which new light has been thrown by recent criticism and investigation. This being impossible, there is no man so pre-eminently qualified to speak for him as George J. Romanes. From personal contact and sympathy with his master, and from years of study in similar lines of investigation, he is probably more thoroughly imbued with Darwin's spirit than any other man living, and his attitude of viewing the biological problems of the day doubtless comes as near to the standpoint which Darwin himself would be expected to assume as is possible to imagine. His present work will consequently possess a double interest and value to those concerned with the literature of Darwinism.

The first volume of the series of three, the only one as yet before the public, is, as the author says in his preface, "likely to prove of more service to general readers than to professed naturalists," being "a systematic exposition of what may be termed the Darwinism of Darwin"; and yet many questions are raised, even in this first volume, in which scientists are greatly concerned. The book is very properly divided into two parts, the first being a demonstration of evolution as a fact, and the second a discussion of natural and sexual selection as more or less complete explanations of the fact. With the first part of the work naturalists are not so much concerned as the general public, for if there be any actual workers in scientific fields at the present day who are not convinced of the validity of evolution as a fact—as a description of the historical growth of organisms—there is no hope for them, and they are not worth wasting time with. With the general public, however, the case is

* Open Court Publishing Co., Chicago.

otherwise. Being unfamiliar with even a smattering of modern biological research, their attention has not been directed in these channels. Mr. Romanes, therefore, very properly considers that he has a public to convince, and argues every question from this standpoint. In criticising the first part of his book, consequently, the only thing to consider is how well and how forcibly, or, rather, from the standpoint of an outsider, how fairly he has presented the case of evolution. Had this work appeared even a comparatively short time ago there would doubtless have been many reviewers who would question the validity of his proofs, but to-day there are few who would have the temerity to openly attack such a demonstration and expose themselves to the criticism which would follow. It is really a question merely of whether his arguments are so presented and his illustrations so chosen that a person unfamiliar with the subject could reasonably be expected to follow him. And this, it seems, he has really succeeded admirably well in doing. The figured illustrations are especially worthy of notice, for both from their profuseness and the judiciousness with which they have been selected they, in many cases, speak for themselves.

After a few pages of introduction, in which the subject is discussed from a general point of view, the testimony of classification is adduced, followed in succession by that of morphology, embryology, palæontology and geographical distribution. In every case he argues with the defender of special creation and a designing deity, showing the innumerable inconsistencies and absurdities which the advocates of that view must maintain. Thus, in the chapter on geographical distribution, he shows that on islands where gales of wind are continually replenishing the mainland forms of life there are few distinct species, while on islands where high winds from the mainland do not prevail the species are, for the most part, distinct. "But," he says, "on the theory of special creation, it is impossible to understand why there should be any such correlation between the prevalence of gales and a comparative inertness of creative activity. And, as we have seen, it is equally impossible on this theory to understand why there should be a further correlation between the *degree* of peculiarity on the part of the isolated species and the *degree* in which their nearest allies on the mainland are there confined to narrow ranges, and therefore less likely to keep up any

biological communication with the islands."* The chapter on embryology is especially worthy of mention as probably the best and fullest argument for evolution ever made from this standpoint. It is noticeable that the general plan of Prof. Joseph Le Conte's work on Evolution and its Relation to Religious Thought has been followed in the first section of the work under discussion, although the illustrations and the method of presenting them are, to a large extent, unlike those of any other expounder of the subject.

I will not attempt to discuss a number of points which might be raised with regard to the second part of the book, reserving this for a future time. There is only one point which need be mentioned here. In the chapter on The Theory of Natural Selection, Mr. Romanes says:† "Next, it must be clearly understood that the life which it is the object, so to speak, of natural selection to preserve, is primarily the life of the species; not that of the individual. Natural selection preserves the life of the individual only in so far as this is conducive to that of the species. Whenever the life-interests of the individual clash with those of the species, that individual is sacrificed in favor of others who happen better to subserve the interests of the species." Why not go a step farther and say that it is the life of the genus, or the family, and not of the species, which natural selection preserves? Species or specific types count for nothing if they come into conflict with higher or better adapted specific types. The record of evolution is a history of the destruction of inferior species to make room for superior. But is it not in reality the individual, rather than the species, which natural selection preserves? I mean, of course, the best individuals. He cites as proof that natural selection works for the good of the species rather than the individual the case of the ant, "which will allow her head to be slowly drawn from her body rather than relinquish her hold upon a pupa." Let us examine this instance a little more in detail. There can be no doubt, apparently, that such an instinct as this does make for the good of the community and against the well-being of the individual concerned.

Suppose, however, this instinct of the ant which he cites had

* Pp. 230–231.

† Pp. 264–265.

not yet been developed. Then any individual ant which varied in its nature towards determination in facing an enemy would be a great benefit to the tribe, no doubt, but would it stand a better chance to survive and leave offspring who would perpetuate this tendency? On the contrary, it would be far more apt to be killed early in its career, for Mr. Romanes does not need to be reminded of the old proverb:

> "He who fights and runs away
> May live to fight another day."

If every individual who possessed this tendency towards self-sacrifice were to be killed off because, as an individual, it was less fit to survive, how could the species ever acquire this instinct? After any altruistic variation was well established it is easy to see how natural selection might favor the group of individuals possessing it, whether it be a mere isolated assemblage or an entire species, in their combined conflicts with other groups or species which did not work in harmony; but the difficulty is to understand how it could become established. The individuals would necessarily contend among themselves for superiority, and this contest would be a more immediate and vital one than the rivalry between allied species, or even different sections of the same species.

The American edition of this work is published in a very neat and attractive form.

C.A.K.

The Contemporary Evolution of Man. By HENRY FAIRFIELD OSBORN.* In this, the first of the Cartwright Lectures for 1892, the author presents a general survey of the anatomical changes at present taking place in man, with the intention of investigating their bearing upon the question of the inheritance of acquired characters. Dr. Osborn believes that all the organs of the human body are in a state of change at the present time, although some are moving much more rapidly than others, either progressively or retrogressively. He proposes the term metatrophism for the "compensating readjustment, whereby the sum of nutrition to any region remains the same during redistribution to its parts." He considers that man is changing in structure as rapidly at the present time as the horse did in evolving from its five-toed ancestor. Variations in the skeleton, teeth and muscles are discussed in some detail. Under

* The Am. Nat. xxvi, 455–481.

the topic, The Limits of Reversion, the author calls attention to the fact that an abnormal organ or structure, even though it resembles some normal structure in a lower animal, is not necessarily a reversion, but may be a coincidence.

There is danger of forgetting the branching plan of evolution and jumping to the conclusion of a connection where none exists. In concluding, Dr. Osborn says: "There are clearly marked out several regions in the human body in which evolution is relatively most rapid, such as the lower portion of the chest, the upper cervicals, the shoulder girdle in its relation to the trunk, the lower portion of the arm and hand, the outer portion of the foot. We notice that these regions especially are centers of adaptation to new habits of life, in which new organs and new relations of parts are being acquired and old organs abandoned.

We observe, also, that all parts of the body are not equally variable, but these centers of evolution are also the chief centers of variability. The variations here are not exclusively, but mainly, of one kind; they rise from the constant struggle between adaptation and the force of heredity."

C. A. K.

The Difficulties in the Heredity Theory. By HENRY FAIRFIELD OSBORN.* In the second Cartwright Lecture for 1892, Dr. Osborn discusses the bearing of the facts of human evolution enunciated in his previous lecture upon the inheritance of acquired characters. The generalizations in this paper are, for the most part, re-statements of his views upon this subject, in some cases from new points of view.

The history of the heredity theory is briefly outlined, and the effect of impacts and strains upon the mammalian foot and the wearing of cusps is again alluded to. The article concludes with some brief remarks on the inheritance of mutilations, the effects of previous fertilization, and maternal impressions. The author is inclined to believe in all three, and especially declares his acceptance of the influence of maternal impressions upon the young. The note upon the inheritance of mutilations of the tails of mice is of interest, but, as the author remarks, would need confirmation.

C. A. K.

* The Am. Nat. xxvi, 537–567.

Revision des Calanides d'eau douce is the title of a work recently published by the well-known zoologists JULES DE GUERNE and JULES RICHARD in the Memoires de la Société Zoologique de France, vol. ii, p. 53. In this work are found described by Prof. WIL. LILLJEBORG several species from California. The work is a most excellent one, and accompanied by numerous illustrations. The following are the species from California: *Diaptomus Eisenı, D. Franciscanus, D. siciloides, D. signicauda, D. Tyrrelli, D. Tyborni, D. oregonensis, Osphranticum labronectum, Epischura nevadensis.* Prof. W. Lilljeborg is now occupied with describing a larger collection of fresh-water Copepoda and Astracoda, collected in California, and would be pleased to receive any additional specimens, in order that the account of this branch of California crustacea may be presented as fully as possible. G. E.

A New Generic Name for the Bering Sea Fur-seal. By T. S. PALMER. Proc. Biol. Soc. Wash. vii, 156. The genus *Callohrinus* is replaced by *Callotaria, Callirhinus* having been used in entomology and also in herpetology.

Description of a New Prairie Dog (Cynomys mexicanus) from Mexico. By Dr. C. HART MERRIAM. Proc. Biol. Soc. Wash. vii, 157–158. *Cynomys mexicanus* from La Ventura, Coahuila, Mex., collected by Mr. C. P. Streator.

The Auk for July, 1892, has a colored plate of the Rio Grande Turkey (*Meleagris gallopavo ellioti* Sennett). *A Study of the Sparrow Hawks (Subgenus Tinnunculus) of America, with Especial Reference to the Continental Species (Falco sparverius* Linn.) By EDGAR A. MEARNS. Beginning with a synopsis of the American species, the author notices the variations of plumage dependent upon age, sex and season. Descriptions are given of new subspecies: *Falco sparverius deserticolus*, Desert Sparrow Hawk, inhabiting "Southwestern United States, north to northern California and western Montana, south to Mazatlan in northwestern Mexico." *Falco sparverius peninsularis*, St. Lucas Sparrow Hawk, from Lower California. *Falco sparverius æquatorilis*, Ecuador Sparrow Hawk, from Ecuador, S. Am. Dr. Mearns's paper is based upon a study of 297 specimens, of which 241 are from North America north of Mexico. Enough phases were noticed to afford a basis for a number more subspecies, but the incipient forms have not been named.

In General Notes, Mr. R. H. Lawrence records the capture of two California jays near Vancouver, Washington, as the first record for that State. The occurrence there of the species is of interest, but was first noted by Nuttall, who met with them near Fort Vancouver.

Mr. T. S. Palmer adds four species to the list of birds of Gray's Harbor, Washington, published in the January number of the *Auk*, to which list a few dozen more additions are given by Mr. Hubbard in the present number of this journal. W. E. B.

The Humming Birds. By ROBERT RIDGWAY. Rep. Nat. Mus. 1890, 253–383, plates i–xlvi. To one having even the slightest inclination toward a love for birds to begin this volume is to read it through. Probably no single family of birds has received more attention from naturalists, nor admiration from all, than the humming birds, of which there are about five hundred recognized species and varieties entirely confined to the New World.

The work is virtually divided into two parts, the first treating of the general subject under divisions into topics. Early History. Names and their Origin. Geographical Distribution. Migrations. Habits. Abundance of Individuals. Actions and Attitudes. Manner of Flight. Disposition. Intelligence. Nests and Eggs, with which are given fourteen plates of illustrations, in black and white, principally after Gould. Voice. Food. Characters and Relationships, illustrated by an enlarged drawing, by Mr. Lucas, of the skeleton of *Trochilus colubris*, and by figures showing the pterylosis of a humming bird. Variations, treating of the size, bill, wing, tail, tail-coverts, are fully illustrated, there being seven plates of outlines of tails. Head Ornaments, etc. Colors of the Plumage, with nine plates illustrating fifteen species. Cause of the Changeable Hues of Humming Birds, closing with Brief Descriptions of some of the more Brilliantly Colored Kinds. Throughout the foregoing pages the technical name is mainly subordinated, and each topic is so fascinating that one wishes there were more of it, as well as of the humming bird verse which appears in appropriate places. The second part, as it may be conveniently termed, treats of the Humming Birds of the United States, illustrated by twelve plates representing thirteen species and twenty-three specimens, in black and white drawings. Subgeneric names have been used in place of

the generic names adopted by the A. O. U., and *Selasphorus floresii* in places instead of *Trochilus floresii* or *T. rubromitratus*. Analyses of species and full descriptions are given, as also a "key to the genera of humming bird occurring in the United States, Mexico, Cuba and the Bahamas," adapted from the author's "Manual of North American Birds." Opinions will differ regarding placing Anna's humming bird as the most beautiful of North American hummers; in California the popular vote would be cast for an adult male Allen's or rufous humming bird, excepting, of course, the straggler Floresi's humming bird. W.E.B.

Outlines of Zoology. By J. ARTHUR THOMSON, M.A., F.R.S.E. In this volume Prof. Thomson has presented the students of zoology with a very valuable general guide. It is essentially a book for beginners rather than for more advanced students, the ground covered being so extensive that no great attention to minute details is possible. The work is especially adapted to the requirements of the novice, from the fact that it is written in a very fascinating style and is clear and, for the most part, simple without any sacrifice of scientific accuracy. Nearly a hundred pages of introduction deal with questions of general and fundamental scientific interest—classification, physiology, cells and tissues, reproduction, heredity, geographical distribution, paleontology and evolution. This section is admirable for the terseness with which the ground is covered. As might be expected, the author lays some stress upon his own peculiar views with regard to metabolism, reproduction, etc., although these are in no wise unnecessarily obtruded. A noticeable innovation with regard to his classification is the inclusion of Balanoglossus and Cephalodiscus among the vertebrates. In giving his reasons for so doing he says that in these two forms "the vertebrate affinities are well marked, and we shall at least emphasize the fact that there are no hard and fast lines of division if we place these two types at the beginning of the chordate series."

The body of the work is occupied with a short account of each class in the animal series. After a table showing the general classification of a group is given a "survey of types," under such topics as general life, general structure, minute structures (forms of cells, etc.), reproductive organs and development. The structure of each group is represented by a rather rough but clear diagram.

A systematic classification giving the distinctive features of each class and order follows, the account closing with a few general remarks on the life and history of the group in question. Although dealing primarily with anatomy, the external form, habits and general classification of animals are by no means slighted. C.A.K.

Journal of Morphology, VI, 1–360. Vertebrate Cephalogenesis. II. A Contribution to the Morphology of the Vertebrate Ear, with a Reconsideration of its Functions. By HOWARD AYERS. In this work a lengthy and exceedingly important investigation of the embryology, morphology and physiology of the cordate ear is presented. The author has made an exhaustive examination of a great number of representative types, and, as a result, revolutionizes many of the generally accepted ideas, both of the development structure and functions of many of the parts of the ear. The work is illustrated with twelve plates and a number of diagrams and figures. Mr. Ayers concludes from his investigations that the vertebrate ear is not related phylogenetically to the invertebrate, but is formed by the union of two sense organs—the superficial canal complex. He finds a close connection between the ear of the alligator and of mammals, and considers that the organ of Corti of the latter is a direct descendent of the organ of Corti in the former. This modifies the position of birds in the scale, so far as the morphology of the ear is concerned. The author says: "Having found, from my own investigations, in three groups of birds — Rasores (Gallus), Columbinæ (Columba), and Passeres (Mimus)—that the development of the cochlea is not so far advanced as in the hydrosaurian reptilia, it will be necessary to change the view advocated by Hasse, according to which the saurian reptilia stand as transitional forms between the amphibia and the lower reptilia and the birds, for it is obvious that in cochlear anatomy the birds hold a place apart from the direct line of descent as typified in the mammalian cochlea." *

Mr. Ayers' generalizations with regard to the development of the ear are of great importance. "Although *ontogenetic* evidence," he says, † "seems to lead to the conclusion that the auditory organ arose by the invagination of a *single superficial sense organ*, it is by no means certain that this is true, for there are certain facts of comparative anatomy and certain phylogenetic considerations which

* P. 227. † P. 231.

point to the conclusion that the auditory organ has arisen by the bringing together of two originally distinct sense organs which were together sunk below the surface." He then gives the evidence for this, which is mainly the distinct origin of the nerve roots which supply the ear. He accordingly considers the membranous labyrinth as a vestigial structure, and prophecies that in the future ear little will be left save the cochlea. Among the points in morphology which he has discovered the following are of general interest: the hair-bearing cells of the cochlea are probably never double, as was formerly supposed; the sense organs on the floor of the cochlea consist of a series of linear fibres closely united together, and are not a single band-like sensory apparatus, as described by previous investigators; the basilar membrane does not possess sufficient elasticity "to serve for the transmission of the delicate undulations which it has been supposed to transmit, and from its composition a great deal of the motion imparted to it would necessarily be lost in transmission;" "the evidence of comparative anatomy is entirely against the existence of the spiral nerve bands;" "the ear is supplied by two distinct nerves which have widely different origins in the brain, and are, in reality, *branches from two nerves*, and so not a discrete cranial nerve, as has formerly been supposed to be the case;" "the so called membrana tectoria of previous authors is, in reality, a hair-band or field of long, slender hairs which spring from the tops of the hair cells and form a waving plume on the crest of the ridge of the organ of Corti;" "the membrana tectoria, the membrana reticularis, Loewenberg's net, and the three or four main trunks of the system of spiral nerves of the cochlea have no existence as such in the living mammalian ear."

The physiological results of Mr. Ayers' investigations are of equal importance with the morphological. He details experiments conclusively proving that the semicircular canals are not indispensable for the equilibration of an animal, which function he very reasonably considers to be exercised by all the nerves of sense in general. He may, however, be a trifle hasty in assuming that the semicircular canals are without any function whatever. He considers "the outer and middle ear to be mere accessory structures acquired by the higher vertebrates in ever-increasing complexity, for the sole purpose of enabling the animal to preserve in the aërial ocean, on or near the bottom of which they live, the necessary

aquatic conditions in which they were born (phylogenetically), and which they must preserve or lose their auditory organ completely." He believes that the cochlear organs alone are enabled to perceive all kinds of sound. The sound waves institute a responsive vibration in all or nearly all the filaments, in succession, of the hair-band of the organ of Corti, according to Mr. Ayers. "Timbre, or the tonal color of sounds, is due to a combination of the stimuli or the effects of the excitation of a series of vibrations of which the main or fundamental tone is most prominent, while the other vibrational impulses make themselves felt as 'coloring' of this base. The combination is a psychical phenomenon, and there is no combined result of simultaneous sympathetic vibrations transmitted from the ear; on the contrary, each vibrational impulse is transmitted to the brain at its full value, and its effect in audition is due entirely to psychical processes."

C.A.K.

Psyche, February, 1892, contains a contribution on the "Blood-tissue" of the insecta by WILLIAM M. WHEELER, continued in the March and April numbers. The papers give evidence of very careful and thorough work in a comparatively unworked field.

C.A.K.

The Nature of the Shoulder Girdle and Clavicular Arch in Sauropterygia. By H. G. SEELEY. Proc. Roy. Soc. LI, pp. 119–151. A comprehensive investigation of the clavicular arch in Plesiosauridæ and Elasmosauridæ, with a scheme of classification for the two groups. In discussing the classification, the author cites facts illustrative of Cope's law of parallelism. He says: "And it is remarkable that many Liassic species have the articular faces of the vertebral centra deeply biconcave, while in many Cretaceous species those surfaces are nearly or quite flat; in the shoulder girdle nothing but continued ossification, apparently, is needed to convert the Liassic Plesiosaurian into the Oolitic and Cretaceous Elasmosaurian type. *Eretmosaurus* is the nearest approach to this type known from the Lias.

It thus appears as though some animals complete their embryology early in life, others at intervals during life, while in most types the embryonic development takes place gradually during successive epochs of geological time, giving rise to classification of its stages, indicated as genera, families, orders; and, therefore, that the young individuals of a late period of time simulate genera of an earlier age."

C.A.K.

PROCEEDINGS OF SOCIETIES.

CALIFORNIA ACADEMY OF SCIENCES. *May 2, 1892.* President Harkness in the chair.

The Librarian reported 185 additions to the library.

Dr. H. H. Behr read a paper on the Flight of Insects.

Dr. Harkness exhibited gall-wasps just hatched from leaf-bud galls of the oak.

June 6, 1892. President Harkness in the chair.

Accessions of fossil and recent shells were reported from Mrs. M. Burton Williamson, Miss McVenn, W. J. Raymond, T. S. Brandegee, Dr. C. L. Anderson, Dr. Dozier, F. Engles, Henry Hemphill, Gustav Eisen, R. Reid, Dr. S. Bowers.

Two hundred and ninety additions to the library were reported.

The President announced the death of J. J. Rey, L. L. Robinson and S. M. Wilson, life members, and of Prof. E. Regel, honorary member.

Dr. Gustav Eisen made a preliminary report on the expedition to Lower California.

June 20, 1892. President Harkness in the chair.

Dr. Gustav Eisen read a paper on the Lost Civilization of the Mayas as Indicated by Archæological Remains in Mexico and Central America, illustrated by stereopticon views.

July 18, 1892. President Harkness in the chair.

The Librarian reported 440 additions to the library.

Mr. S. W. Holladay read a paper on Earthquake Freaks.

Charles A. Keeler gave an account of his recent trip to the Farallon Islands, and exhibited a portion of the collections made on the trip.

CALIFORNIA BOTANICAL CLUB. *May 16, 1892.* President Campbell in the chair.

The following were elected to membership: Mrs. Austin Sperry, Adolph Sutro, E. J. Molera, Miss Louise Bundschu, F. N. Notes-lein, Mrs. M. A. Wills, Miss Clara Rice, Mrs. C. E. Miller, Mrs. F. Butler, Mrs. Edward Probert, Theodor Holm, Alfred J. McClatchie.

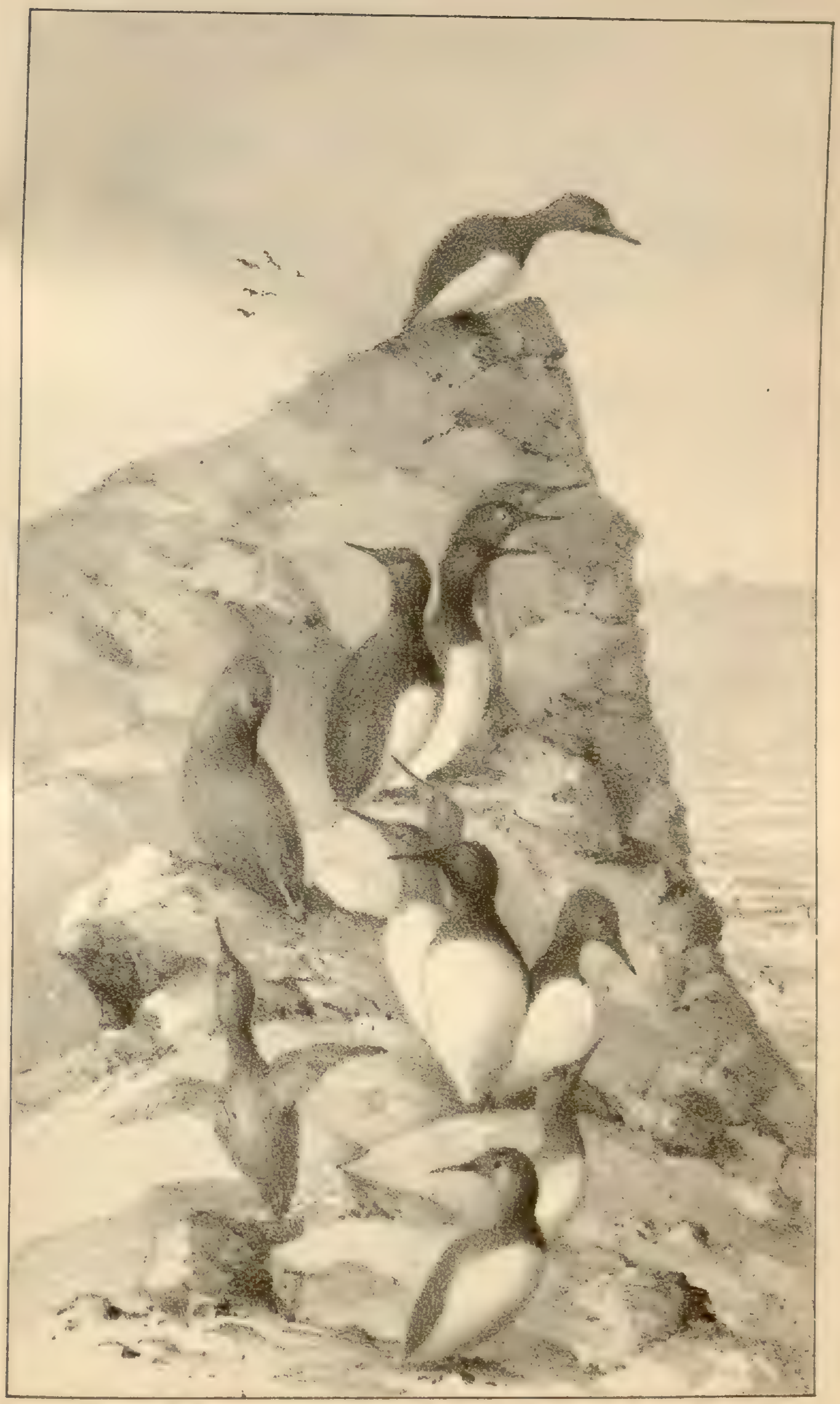
Prof. D. H. Campbell delivered a lecture on Ferns and their Relations, explaining their affinities as shown by the later researches into their structure, and the details of their reproduction as com-

pared with that of their allies. The audience were enabled to inspect specimens of most of the plants under consideration.

July 11, 1892. Mrs. Brandegee in the chair.

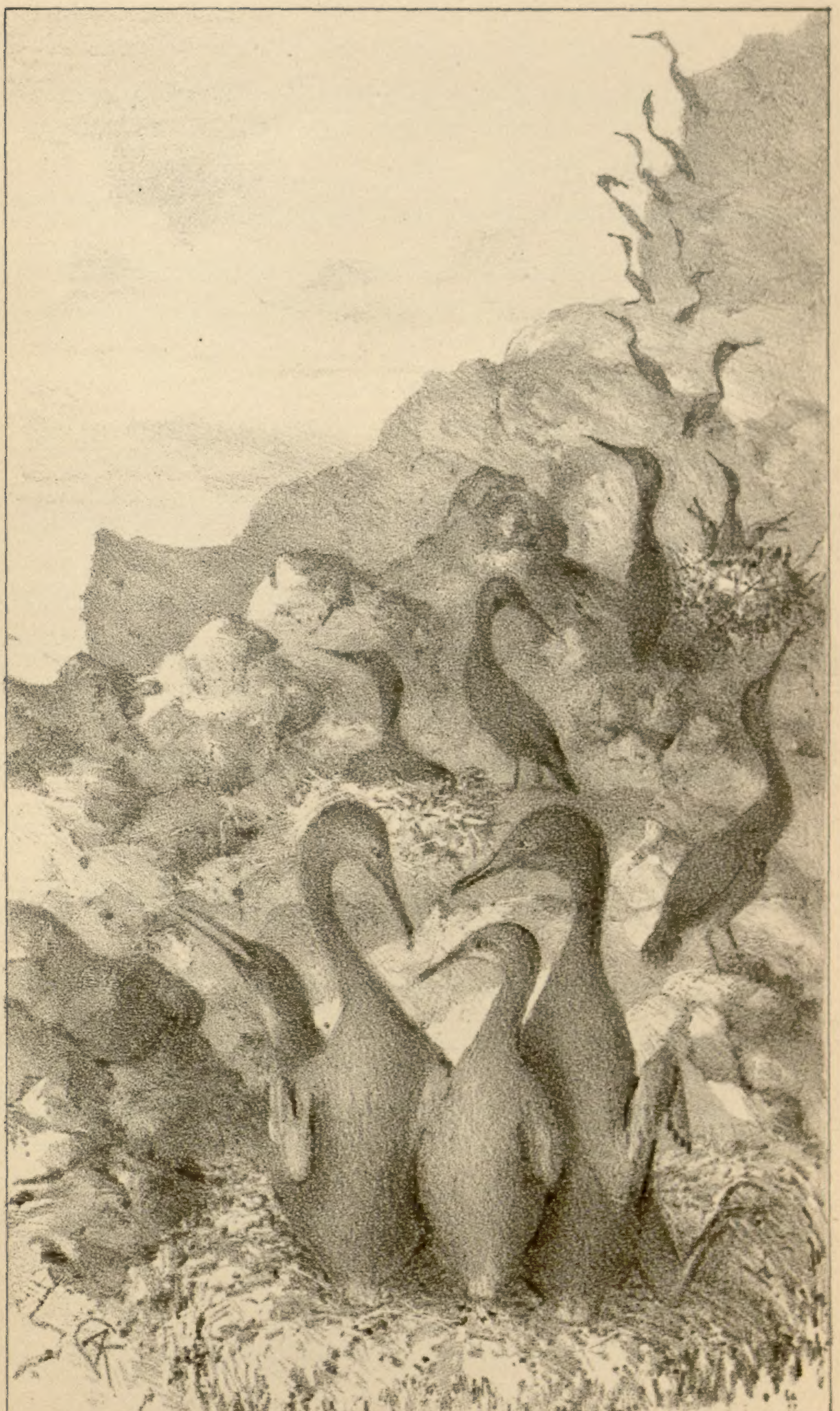
The following were elected to membership: A. W. Robinson, Mrs. M. E. P. Ames, Miss Aphra Rogers, Miss Mae F. Dority, Robert L. Toplitz, Mrs. R. L. Toplitz, Mrs. E. J. Corbett, H. S. Durden.

California Zoological Club. During April and May the California Zoological Club, under the auspices of the California Academy of Sciences, gave a course of popular lectures on zoology, illustrated with stereopticon views. The lectures were delivered by Charles A. Keeler, as follows: 1. Creation of Law—a popular exposition of the doctrine of evolution, April 21. 2. Fundamental Groups of Animals—an explanation of the principles of classification and illustrations of the leading types in zoology, April 28. 3. The Mammalia—illustrated by about 80 views of representative species, May 5. 4. The Mammals of California—illustrated with stereopticon views and prepared specimens, May 12. 5. The Bird, May 19. 6. Song Birds of California, May 26.



C.A.K.Del.et.Sc.

CALIFORNIA GUILLEMOT



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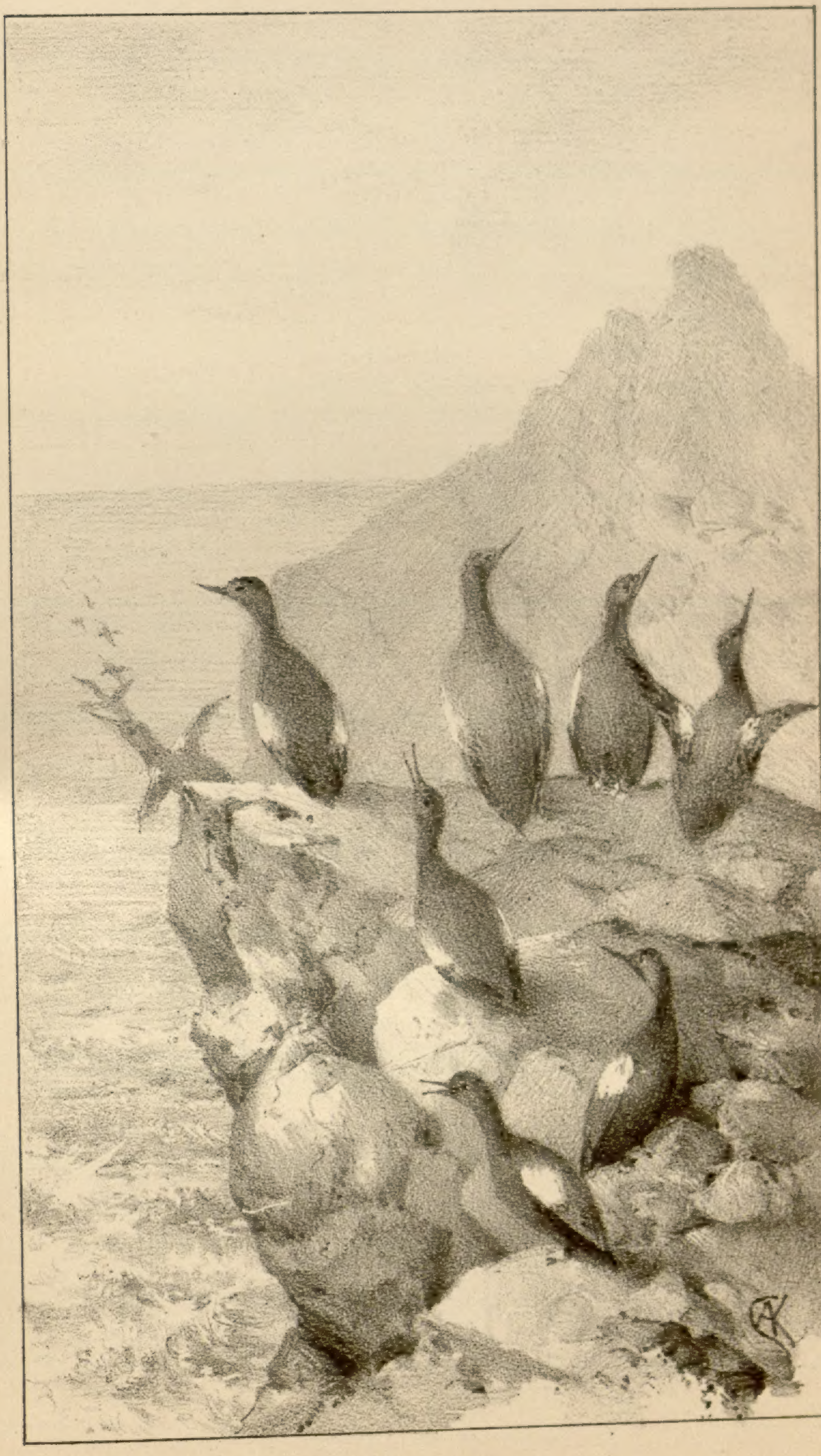

PIGEON GUILLEMOT

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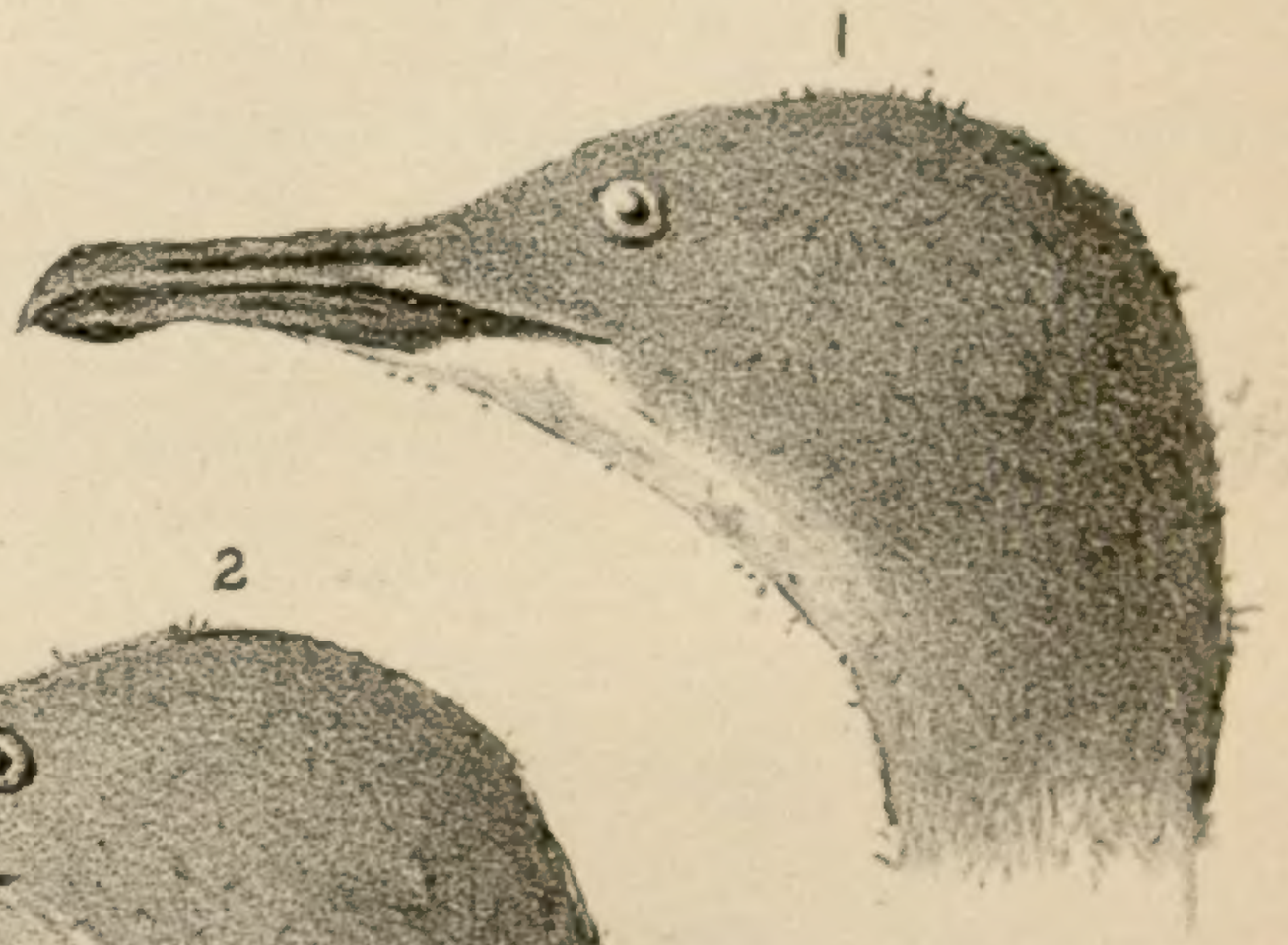

FARALLON CORMORANT

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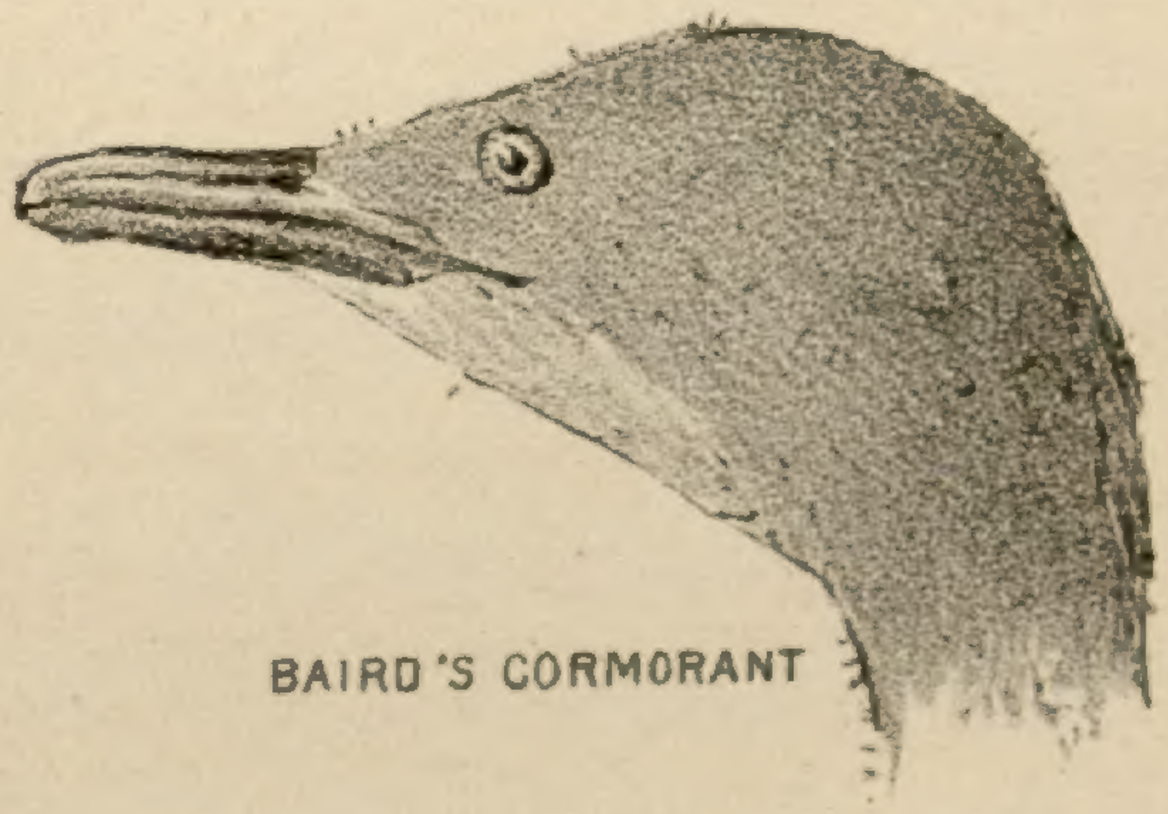

BAIRD'S CORMORANT

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TUFTED PUFFIN

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PIGEON GUILLEMOT

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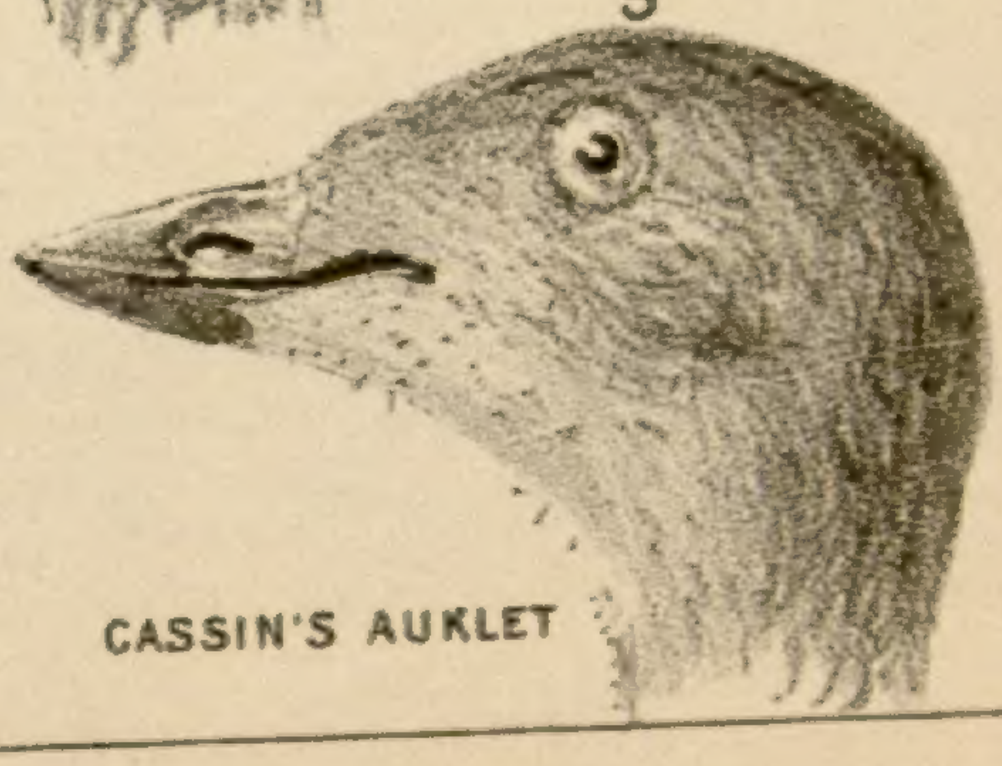

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